AUDIO VISUAL COMMUNICATION REVIEW

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TOWARD A GENERAL MODEL OF COMMUNICATION

• GEORGE GERBNER

This comprehensive paper is an attempt to present a unified approach to the study of communication in the form of a general model. *George Gerbner is assistant professor in the Institute of Communications Research, University of Illinois.*

THE FIELD of communication study is having communication troubles. It has no clear idea of its subject matter. It has no framework for the discussion of its technical concerns. And it has no value orientation for making much sense of its findings in terms of urgently needed judgments.

Vigorous search for a technique *and* value-oriented theoretical structure appears to be the major need in the progress toward a science of communication. In its short history, *AV Communication Review* has done much to serve that need; it has stimulated thinking and discussion about basic problems in theory and research, published accounts of specialized models relating to certain aspects of communication study, and thus promoted the search for a general theory of communication.

Our purpose is to make a contribution to that search by presenting a *general model* of communication. The model incorporates some features of previous models (see bibliography) and adds some new features of its own. It structures communication into 10 related aspects and areas of study. These aspects are discussed and illustrated through the construction of a verbal and a graphic version. Construction of the model is followed by the demonstration of some technical applications, the discussion of theoretical and research implications, and the development of some normative social concepts and directions in communication theory.

CONSTRUCTION OF THE GENERAL MODEL

Students of communication theory and research have much in common with the physicists Weisskopf and Rosenbaum who, dis-

cussing "A Model of the Nucleus" in the December 1955 *Scientific American,* complained:

> Modern physics is frequently accused of deserting the real world for abstract mathematics. Instead of attempting to explain nature in terms of what we can see and feel, the impeachment runs, theoretical physicists offer only an arid set of equations whose physical meaning they will not even think about, let alone interpret to the vulgar.

The physicists thought the reproach undeserved. Model building is a major concern in nuclear physics, they noted; nearly every theory began with some model representing events and relationships understandable in terms of a real world. "Every model we build," they wrote, "is an effort to make sense of some particular class of experimental results. . . . Hence our different models are not mutually exclusive. . . . They can often be combined to give more complete understanding."

Model building and combining is thus an attempt to view complex, and often disjointed, processes and studies in a unifying framework which suggests an approach to further investigation. It permits the structuring of an event, and a field of study, and the discussion of relationships, processes, and their implications, in understandable and graphic terms.

The Verbal Model

A good verbal model is a concise explanation which describes an event and at the same time identifies its chief parts or aspects. It is based upon a conscious theoretical approach to the event it describes; and it includes a word-by-word or phrase-by-phrase identification of those aspects of the event that have actually been the focal points of concern and investigation.

What might be a description of a communication event, of one link in the chain of a communication process, that could serve as such a model? We can start with a communicating agent (source or destination) designated as *someone.* This communicating agent must perceive or have *perceived an event* of some kind in order to initiate or receive communication, and must *react* to the perception in some way. The nature of this reaction is influenced by the *situation* in which it takes place. The communicative reaction must be made through some mediating agents (channels, media), in other words *through some means.* It is transmitted in order *to make available* some communication *materials.* Materials must be *in some form* or pattern in order to carry a message. As

the reaction to materials takes place in a situation, so every message is perceived *in a context.* All these aspects enter into the formation of *content.* And, finally, we can assume that *some consequences* always follow perceived content, whether or not it achieved a desired reaction.

If we accept this general description, we can then proceed to construct the verbal model by putting together its salient characteristics, represented by the italicized words and phrases. Such a verbal model follows below on the left. It is broken down, line by line, into the 10 basic aspects of communication. These aspects are numbered for later reference. In each line, on the right, appear a few words briefly identifying in a preliminary fashion some types of study and research associated with each aspect.

Verbal model	*Areas of study*
1. Someone	Communicator and audience research
2. perceives an event	Perception research and theory
3. and reacts	Effectiveness measurement
4. in a situation	Study of physical, social setting
5. through some means	Investigation of channels, media, controls over facilities
6. to make available materials	Administration; distribution; freedom of acces to materials
7. in some form	Structure, organization, style, pattern
8. and context	Study of communicative setting, sequence
9. conveying content	Content analysis; study of meaning
10. of some consequence.	Study of over-all changes

A more detailed discussion of these aspects of communication will follow the construction and demonstration of the graphic model. It might be emphasized here, however, that while the 10 aspects can serve to structure the field of communication study, they represent shifts of emphasis rather than tight compartments. In fact, nearly every aspect can be viewed in terms of any of the others.

The Graphic Model

The advantage of a schematic model is that it can represent positions, directions, and relationships graphically. Once the model is understood, it can be used to explain visually complex events and concepts. But a graphic model can be cluttered up in the attempt to schematize concepts more clearly explained in words. So we shall use the two models jointly, and consider them two representations of the same basic model, each expressing certain things not easily described by the other.

The graphic model can be best understood by following its construction along the steps of the verbal model. Let us assume that a man notices a house burning across the street and shouts "Fire!" We begin to schematize the aspects of this communication event by our man, *someone,* represented as Step 1 on Figure 1, a human head labeled *M* for man or machine.

Next comes the *event and its perception.* The event, here a burning house, is shown as circle *E*. Its perception is indicated as Step 2, a line leading horizontally from circle *E*, the event, to a circle inside *M;* the inside circle is labeled *E′* — event *E* as perceived by *M*.

In Step 3 of our model, *M reacts* to having perceived the event. Reaction as such cannot be represented on a generalized communication model. (If this reaction involves some use of some means to initiate a message, it will be represented under Step 5.)

Step 4 takes note of the fact that all perceptions and reactions occur in a *situation.* On Figure 1, *M* is shown observing *E* from behind a window, indicating one feature of the situation. It is usually impractical to schematize a situation on a generalized model.

Step 5 marks the communicative nature of the reaction. It designates the *means,* the mediating agent capable of transmitting a signal (here "voice"), as a line leading downward from the communicating agent, *M,* to the communication product, *SE*.

The means serve *to make available materials* to *X* destinations. Availability for perception is shown in Figure 1 as Step 6, a line leading horizontally from the communication product to another person, M_x.

Use of some means becomes a signal containing a message only if it is not random; that is, if it is *in some form.* Step 7 indicates the formal characteristics of the use of the means. It is

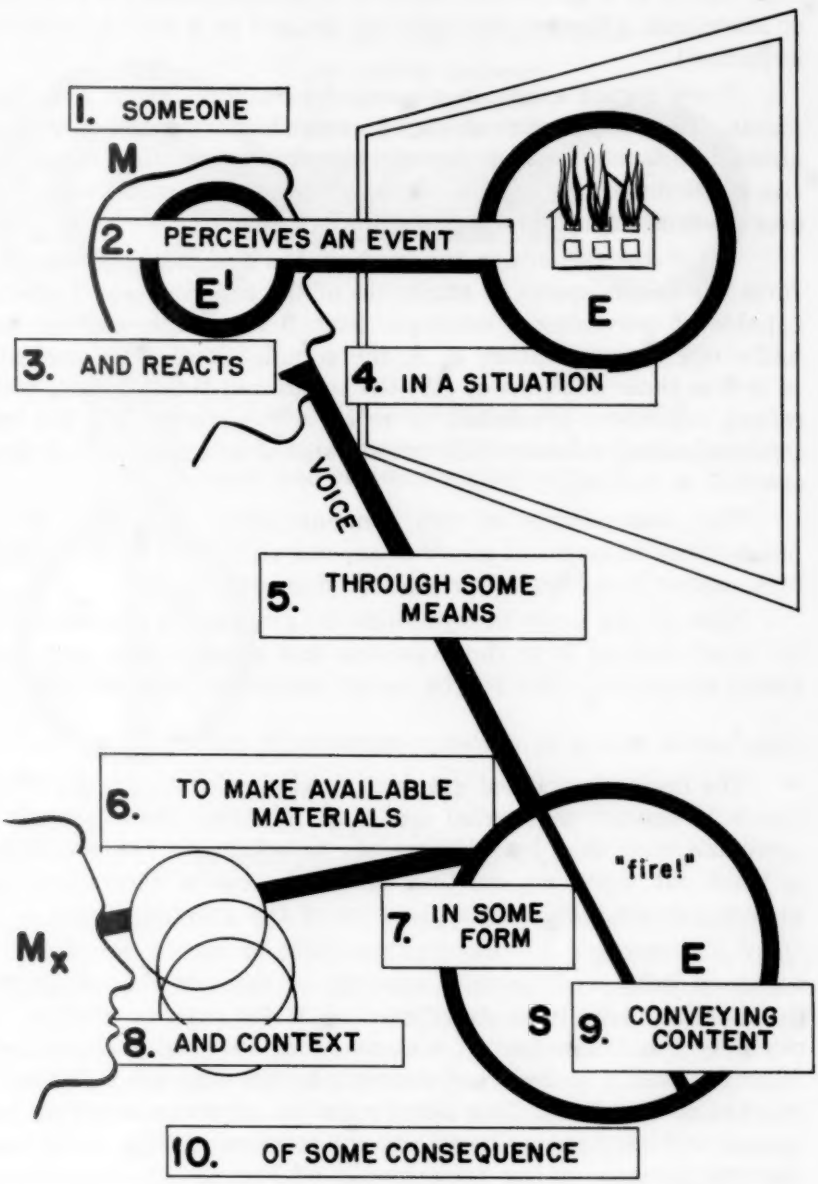

Figure 1

Steps in the construction of the graphic model

represented as a half-circle attached to means, labeled *S* for signal or statement. (Here *form* might be denoted as a certain language sequence.)

Every signal exists in a *context* of other signals and statements. The three circles of Step 8 along the horizontal, perceptual, dimension denote context. Again, it is often impractical to schematize context on a generalized model, except by considering it an ever-present feature of the perceputal aspect.

The *content* qualities inherent in *M*'s use of the means in *S* form are those aspects or attributes of the communication product capable of conveying a message. Step 9 represents content as a half-circle complementary to *S*, the signal. Content is marked *E* to denote those qualities of *SE*, the communication product, which reflect, represent, symbolize, or refer to the event. Thus the total communication product, *SE*, means signal or statement *S* about event *E*, in this case: "Fire!"

The *consequences* of this communication event can be appraised only in terms of all other aspects plus time; Step 10, therefore, cannot be adequately represented schematically.

Now we are ready to crystallize the generalized graphic model. We shall restrict it to those aspects and relationships best illustrated graphically, and let the verbal version express the rest.

Generalized Model of a Communication Event

The basic generalized graphic model appears as Figure 2. We match it against the verbal model to illustrate those aspects of communication that lend themselves to schematic representation, to point out those aspects that cannot be easily diagramed, and to demonstrate some unique features of the graphic model.

1. "*Someone . . .*" The first variable of our model, shown as a human head on Figure 1, appears on the generalized graphic model (Figure 2) as a circle marked *M* for man or machine. *M* might be the destination of a message, or its originator, or both. *M*'s relationship to the other elements in the diagram indicates its role (as on Figure 6). In a communication sequence involving both human and mechanical transmission, mechanical *M*'s can be represented by squares (as, for example, on Figure 4).

2. "Someone *perceives an event . . .*" The perceptual aspect of communication forms the link between events and their reflection, or sensory, creative, cognitive reconstruction in and by the com-

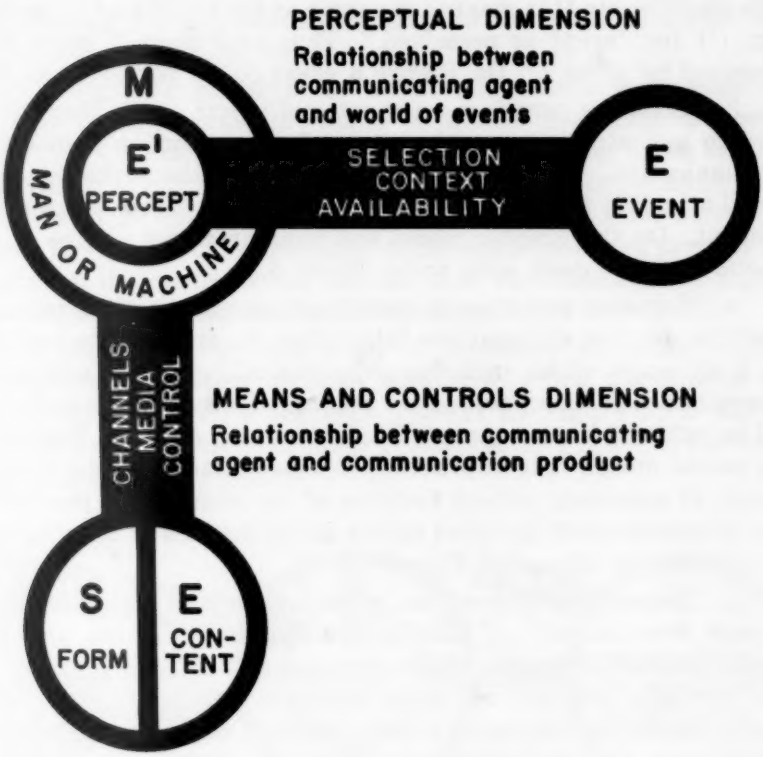

Figure 2
The basic generalized graphic model

municating agent, *M*. The event perceived can be a nonmediated, "natural" event, such as the burning house on Figure 1. In that case it is represented on the graphic model as an undivided circle marked *E* for event, as on Figure 2. Or it can be a mediated event, "surrogate," or communication product, as, for example, a description, picture, or television image of the burning house. In that case it is represented as a divided circle marked *SE* for "statement about event." (An example of that is shown on Figure 3 where a communication product, *SE*, is perceived by M_2 and M_3.)

Availability of the event (*E* or *SE*) for perception by *M* is shown by a line leading horizontally from the *E* (or *SE*) circle to the *M* circle. Its perception is indicated by leading this horizontal

"selection-context-availability" line to a smaller circle inside *M*. This circle inside *M* is marked the same as the event plus a "prime" sign (′) for "event as perceived." Thus on Figure 2, event *E* is perceived by *M* as *E′*. On Figure 3 event *SE* is perceived as *SE′*.

3. "Someone perceives an event *and reacts* . . ." There is no need to indicate the general nature of a reaction on a model of communication. The purpose of this aspect on the verbal model is to call attention to the area of effects study and effectiveness measurement. On the graphic model the communicative nature of the reaction will be dealt with under Point 5.

4. "Someone perceives an event and reacts *in a situation* . . ." Every perception and reaction takes place in, and may be modified by, a situation which includes physiological, physical, and social dimensions. (The communicative setting of other statements, etc. will be referred to as context.) While this is an essential feature of the verbal model, it is impractical to schematize it on the graphic model. If necessary, salient features of the situation of perception and/or reaction may be noted anywhere on the field of the diagram, as was done on Step 4 of Figure 1.

5. "Someone perceives an event and reacts in a situation *through some means* . . ." The means signify the agents, arrangements, controls, through which response can become communication product, and can be made available for perception. Thus *means* stands for channels; media; physical engineering; and administrative and institutional facilities for distribution and control. Under this aspect, the emphasis is on production and control; results in terms of actual distribution and availability for perception are examined below under the next heading, availability.

On our generalized graphic model *means* and controls appear as a vertical line relating *M*, the communicating agent, to *SE*, the communication product. Thus while the horizontal dimension indicates the perceptual process, the vertical axis denotes certain characteristics of the production and control aspect of communication: the *means* through which the communicating agent or agency creates, and distributes its communication products.

6. "Someone perceives an event and reacts in a situation through some means *to make available materials* . . ." *Availability* is the result of the creation, control, and distribution of communication products as it actually works out in a certain time and place. In a practical sense, something is *available* if it can be perceived.

Availability is thus a feature of the horizontal, perceptual dimension relating the communicating agent to the world of events and statements *available* to him.

7. "Someone perceives an event and reacts in a situation through some means to make available materials *in some form* . . ." To carry a message, use of the means must be nonrandom. It must have some sequence, pattern, organization not found in single units or elements of its use; this is what we call its *form.* The formal characteristics of the communication product *SE* appear on the model as the half-circle *S,* for statement or signal, attached to the means axis and complemented by content *E.*

It might help at this point to introduce an example of a specific communication sequence diagramed along the lines of the general model. Such a sequence appears as Figure 3; it will be discussed along with continuing references to Figure 2, the basic generalized graphic model.

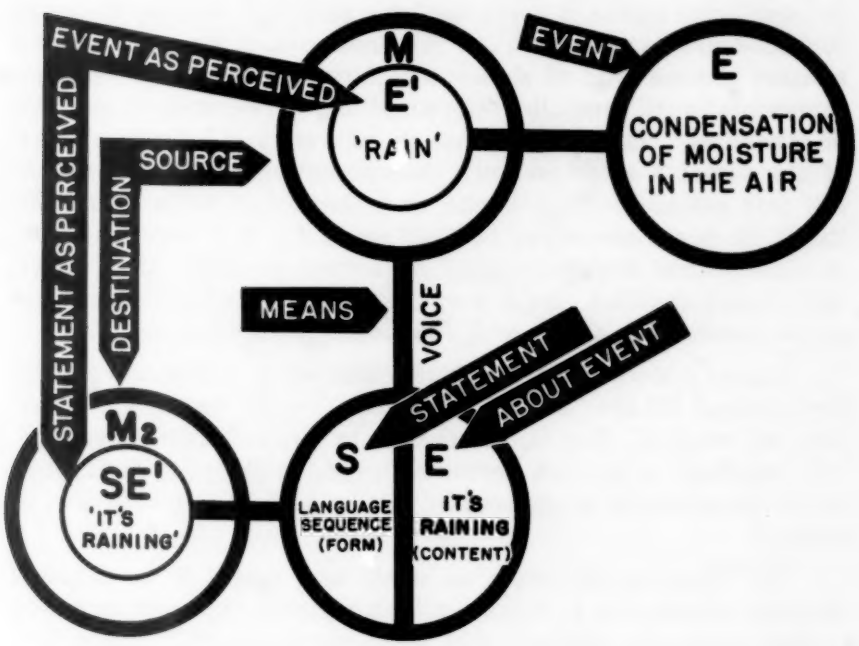

Figure 3

Aspects of a communication sequence illustrated on the graphic model

On Figure 3 a person, M_1, selects for perception event E, "condensation of moisture in the air." This is perceived as E' (recognized and mentally verbalized by M_1 as "rain"). M_1 reacts by using the sound channel to make his voice available for perception by M_2. His voice is modulated and patterned to form signal S, shown on Figure 3 as "language sequence."

8. "Someone perceives an event and reacts in a situation through some means to make available materials in some form *and context* . . ." The specific meaning in which *context* is used in our model is as the communicative setting of statements in space and time. Thus context, along with selection and availability, is a function of the perceptual, horizontal, dimension. (See Figure 2.) On Figure 3, context is not specifically marked. It would require other E or SE circles connected horizontally with E' to indicate that M_1's statement about the rain is perceived and interpreted by M_2 in the context of other statements and perceptions about the weather.

9. "Someone perceives an event and reacts in a situation through some means to make available materials in some form and context *conveying content* . . ." Any nonrandom, structured transmission is some kind of signal; any form, or signal, carries some representational, symbolic, referential, or correspondence qualities or attributes. That is to say that an inherent and inseparable part of any signal is some *content;* when perceived and recognized we call this *meaning.* Thus signal or statement S never stands by itself. It is complemented by half circle E. The communication product SE has, therefore, signal, or formal, qualities (the S part), and content qualities (the E part) marking the fact that every signal or statement is about, or is occasioned by, some event.

Figure 3 shows that the content attributes of the communication product SE are "about" (are occasioned by, and are in reference to) event E, that is, the change in weather. Statement SE, "It's raining," is in turn perceived by M_2 as SE'. Its "meaning" would be generally recognized by him as also calling attention to event E.

10. "Someone perceives an event and reacts in a situation through some means to make available materials in some form and context conveying content *with some consequences.*" Every perceived statement has some "effects." Our model divides "effects" into two types. The first is measured by the intent, or objectives, of the communication. This type is better named *effectiveness* in reach-

ing a desired objective; it is classified under Point 3 of the model, the *reaction.*

The second type of "effects" is independent of "success" on terms measurable by the intent or objective of the communication. These may not even be apparent in the awareness of either communicator or audience, or in the nature of the reaction at a certain time. These are classified as *consequences.* They include all changes, intended or unintended, desirable or undesirable, that might take place consequent to the communication. For example, pedantic overemphasis on certain trivial details in a classroom might be "effective" as measured by a test on those details. But its *consequences* might also include loss of interest, hostility, and other undesirable attitudes.

Some Examples: Mixed Sequence, and Feedback

Figure 4 presents a mixed human and mechanical communication sequence. The communication event portrayed might be a telephone call, transmitting a single statement from one person to

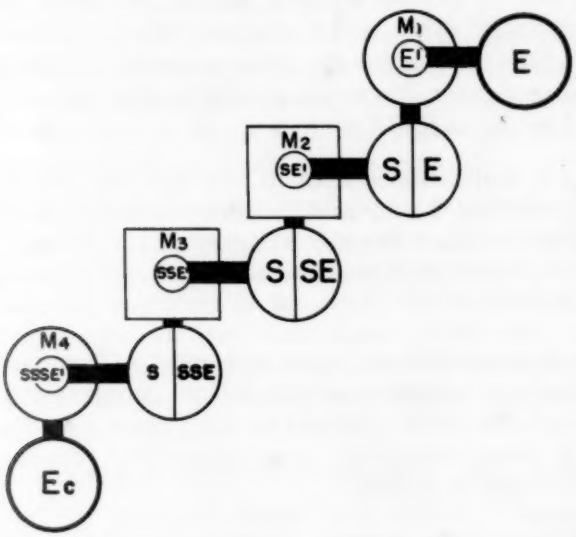

Figure 4

Communication sequence with human and mechanical communicating agents

another. It is initiated by M_1, the source who perceives event E.

Let us assume that E is characterized as "disordered energy" or "rapid movement of air particles." M_1 sitting in his apartment, perceives this event as E'—physical discomfort associated with heat. He reacts by picking up the telephone receiver-transmitter, which is represented by the square M_2, and making statement SE by means of sound.

The original statement about the event, SE, is, "It's very hot here." This is "perceived" by M_2 as mechanical energy SE', and is recoded by electronic means into an electrical energy signal pattern. This signal has been occasioned by the first statement about the event, and is, therefore, SSE, meaning signal about statement about event. SSE, the second communication product, is what is transmitted over the telephone wires.

SSE, which is in the form of electrical energy patterns, is "perceived" by another telephone receiver-transmitter instrument M_3, as SEE' at the receiving end. M_3 recodes SEE' by electronic means into a mechanical energy signal pattern which is also a product of all previous statements, and is, therefore, communication product $SSSE$. This is the original statement about event E, namely SE, "It's very hot here," plus some accumulated residues of intervening signals, the spurious SS, usually called "noise." It is perceived by M_4 as $SSSE'$.

M_4, say a maintenance man in the building, reaches for the temperature control knob, and, without wasting another word, turns down the furnace, thereby bringing about E_c, an event characterized by a more orderly, cooler, arrangement of energy in M_1's apartment.

Figure 4 represents an "open sequence" of communication in the sense that the initiating event did not automatically activate the signal that eventually changed its state from E to E_c. Figure 5 represents a "closed sequence" accomplished by "feedback," as in an automatic control system.

M_1 on Figure 5 is a furnace. It reacts upon an undivided circle E, a nonmediated event, in this case again air temperature. In other words, the energy output of the furnace is coupled with the air surrounding it. Changes in this energy output are "perceived"

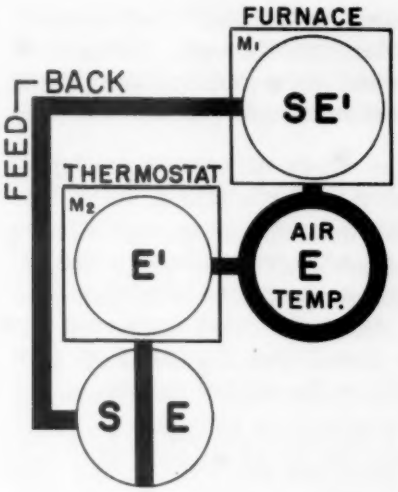

Figure 5
Automatic control: closed communication chain with feedback

by M_2, a thermostat. The perception is E', probably on mechanical terms such as movement in a thermocouple due to changes in temperature. A small portion of the total energy output has thus been introduced into the thermostat, activating it. It reacts by recoding mechanical energy into an electrical signal, possibly coded in terms of changes in the flow of current, representing certain changes in the initial event E such as "too hot" or "too cold." This is signal SE. This signal, in the form of an electrical pattern, is "fed back" to the furnace, M_1, which "perceives" it as SE'. The furnace is so constructed that the "perception" of electrical patterns coded in a certain way by the thermostat activate it to shift into an "on" or "off" position, thus modifying its total output. Automatic control has been accomplished through feedback in a closed chain. Some of the energy output of the furnace was introduced into the thermostat, transformed into a signal, and "fed back" into the furnace as information regulating its total energy output.

The schematic representation of more complex communication situations becomes an interesting and often quite involved undertaking. It is possible to build group, or even mass communication models, including instances of feedback, misperception, communication failures, etc. If used with some consistency, and within their limitations, the models call attention to the focal aspects of communication, and permit tracing and discussion of these aspects and of their relationships.

SOME IMPLICATIONS FOR RESEARCH AND THEORY

The study of communication is a potentially seminal, organizing discipline. That is why it cannot be defined and organized along its "own street" alone, in a narrow, technical manner. For its "own street" is a busy crossroads of many disciplines in science, art, education, engineering, and of a great deal of social and

philosophical concept-building. Organizing the traffic in this crossroads involves, in some sense, all who pass through. Along with the technical matters of setting up road signs and traffic lights, it involves some basic directions and orientations.

Any systematic approach to the study of communication is likely, therefore, not only to structure research and practice into manageable categories, but also to have far-reaching implications, often as broad and controversial as any set of basic scientific assumptions. These implications and assumptions should not be avoided in the discussion of any model, for they spell out the approach upon which the model is based, and the point of view from which it attempts to throw light on its subject matter.

The second part of this paper is devoted, therefore, to a discussion of our model following the sequence employed in the first part, but emphasizing the division of research and practice into the 10 aspects, and some of the basic theoretical implications involved.

1. *M Roles: Communicator and Audience Research*

The *someone* of the verbal model, the communicating agent, is the *M* element of the graphic model, represented by a circle (for man) or square (for machine), and always with a circle inside it standing for perception. Figure 6 portrays *M* in three of its roles. M_1 is a communication source; he perceives event *E* and makes statement *SE* about it. M_2 is a destination; he perceives statement *SE* but makes no communicative reaction. M_3 is both destination and source; he perceives statement *SE* and reacts by making statement *SSE*.

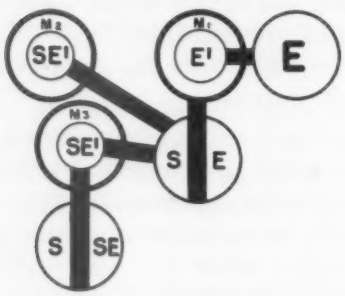

Figure 6
The communicating agent, M, in three of its roles

The study of *M* roles is the area of communicator and audience research. It involves primarily the investigation of individual, group, and institutional characteristics of communicators, and the social, historical, and geographical study of both communicating agents (or agencies) and audiences. Included among these charac-

teristics are distribution; density; age; sex; education; training; intelligence; occupation; income; buying habits; preferences; religion; family, peer, community relationships; and social, cultural, or ethnic status; etc. as communication variables.

2. *The Perceptual Aspects of Communication*

M "perceives an event"—but on what terms? This second aspect of our model involves the study of perception as an element of communication. The horizontal axis of the graphic model, linking *M* to the world of events, represents the perceptual process. The model also indicates that although perceptions are occasioned by events, and thus reflect events in some way, they also differ from events; that perceptions are functions of both *E*s and *M*s; and that statements about events stem from *M*'s way of perceiving events.

Different approaches to the study of perception range along the horizontal axis, according to relative emphasis given to the structuring or dominating effects of either *E* or *M* upon *E'*. For example, the transactional approach, familiar to readers of this journal (13), stresses the structuring effects of *M*'s assumptions, point of view, experiential background, and other related factors, upon the perception, *E'*. Here, *E*, the event, is only "something out there," almost "created" in the act of perceiving it. The transactionalists demonstrate that in some situations different *M*s perceive different phenomena occasioned by the same event, or even "distorted" phenomena until and unless *M*'s point of view and assumptions about the event can be checked and modified through action.

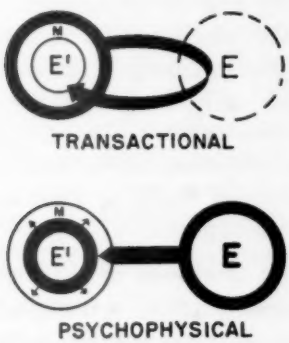

Figure 7
Two approaches to the study of perception

The upper portion of Figure 7 shows a modification of the horizontal dimension of our diagram illustrating the transactional approach. It shows a man "transacting" through his "assumptive form world" (*M*), and through "something out there" (*E*), thus "creating" his perceptions.

Equally familiar is the opposite, psychophysical, approach to perception. (6) Here *E* is a firmer, independent variable; the world of material events, sounds, shapes, and forms is "in control," and perceptions are remarkable in their fidelity and adequacy under favorable conditions. The perceptual organization of *E′* corresponds to order and organization inherent in the universe of perceivable events. Learning and sharing more reliable perceptions is primarily a problem of becoming more sensitive and discriminating to stimuli.

The lower portion of Figure 7 illustrates the psychophysical approach in which the independent event, *E*, controls the dependent perception *E′*. The perception in turn acts upon the stimulus field, the organism *M*, making it more sensitive or "perceptive" to stimulation by *E*.

Our basic model also postulates the prior existence of independent reality *E*, giving rise to all perceptions. But it does not use any arrows; it attempts to take into account the creative, interactional nature of the perceptual process, avoiding any implications of either solipsism or mechanism.

3. *Reaction to Communication: Research on Effectiveness*

Investigations of how *M*s react to events or statements perceived are generally classified under study of "effects." Our model, as noted before, divides "effects" into two categories; the first is *effectiveness,* measured by the criteria of the objectives of presentation and classified under the present heading. The second is *consequences,* measured by criteria independent of the objectives of the presentation, and classified under point 10.

Effectiveness, then, is measured by specific objectives. If the objective is learning, did learning take place? Was it short- or long-range? If it is persuasion, did opinion change take place? If it is making a sale, did it result in sales? And so on. Such are the questions investigated under the *reaction-effectiveness* category.

When the emphasis shifts to the communicative nature of a reaction, then it comes under the heading of study of means, form, or content, and is classified under those aspects.

4. *Situational Aspects: Conditions and Methods of Presentation*

Perceptions of, and reactions to, presentations are also affected by the *situation* in which they take place, including the method of presentation. *Situational* variables in communication may be physical, social, or procedural.

Physical variables include the setting, room size, arrangement, light, sound, noise, heat level, etc. Social variables include group size, structure, composition, cohesiveness, and the like. Procedural variables refer to the manner of presentation and utilization. Investigations of such variables are classified under the *situational* aspect of communication study.

5. *The Means: Channels and Media, Distribution and Control*

All communicative reactions are controlled by some *means*, facilitating the production and distribution of communication products. This aspect of communication is represented on the graphic model by the vertical dimension, relating the communicating agent or agency, *M*, through the *means* axis, to the communication product, *SE*.

Study of the *means* includes investigation of (a) material agents (channels and media) that facilitate the transmission of signals; (b) choices and combinations in the use of means; and (c) engineering, administrative, and institutional facilities controlling signals and their distribution.

The control and distributive phase of the study of means is closely related to the next aspect, availability of materials. The difference is that under *means*, research is centered on specified means and facilities producing communication, and controlling distribution, while under *availablity* the problem is to determine what is actually available for perception at specified times and places.

This distinction becomes crucial especially in a discussion of the place of control, and of the relationship between control and freedom in social communication. It was inherent in the foregoing discussion that means of transmission must be controlled to produce nonrandom forms (that is, signals, statements), and to enhance economy, efficiency, and effectiveness in communication. It will be suggested under the next heading that facilities producing communication products may be controlled for the purpose of assuring equitable distribution, hence public availability, of statements reflecting all pertinent views about events of public concern.

6. *Availability: Study of Freedom and Control in Communication*

It has been noted that the aspect of *availability* has two related facets. One has to do with control of *means* and transmission facilities for the production of signals and for their *adequate* distri-

bution. The other facet has to do with control of facilities for the purpose of *equitable* distribution, and with techniques for measuring the extent and nature of actual distribution of communication products *available for perception.*

The problem of equitable distribution of all statements pertinent to decision-making on public issues goes to the heart of the issue of freedom in industrial society, where equitable distribution hinges upon control of the means of mass distribution, that is, of the mass media.

The case for freedom in communication rests upon the theory of self-government. The theory of self-government assumes that the majority of people are capable of making, and observing, correct rules and responsible controls in the public interest, if they can freely select and discuss diverse views and reasons in a representative context of the availability of all pertinent evidence. Self-government thus places the individual in two simultaneous roles. In his role as the governed, he is subject in his private actions to necessary rules and controls. But in his role as the governor, free citizen, of the self-governing society in which he lives, he is responsible for improving the laws; therefore his freedom of thought and speech must be unabridged, subject to no law but guaranteed by law, to promote free criticism and improvement of the laws that govern him.

The structure of our model of communication illustrates the relationship between control and freedom in a self-governing society. Controls are a feature of the vertical, and freedom of the horizontal dimension. The two are interrelated; there is no freedom of selection unless there is control over facilities to assure equitable distribution and availability.

Controls along the vertical (*means*) axis are thus essential both for the adequate transmission of signals, and for their equitable distribution. In a social sense, *means* is the sphere of private actions: access to and use of facilities to further individual views must be subject to rules and controls of law.

Freedom along the vertical axis representing *selection, context, and availability* for *perception,* is both an outcome of controls over the *means* of distribution, and a prerequisite for continuous improvement of means and controls. This is the sphere of public availability and perception, the communication requirements of free thought, speech, and decision-making, whose abridgement in

any way is proscribed by the First Amendment. The reason for the Constitutional guarantee of free press is thus to safeguard the *thinking process* of the community by making it responsible for assuring the equitable distribution (which means mass distribution) of all views and evidence pertinent to public issues. The attainment of freedom along the horizontal axis depends upon the positive exercise of that public responsibility for regulating private use of the facilities of communication along the vertical axis, in order to safeguard *equitable* availability.

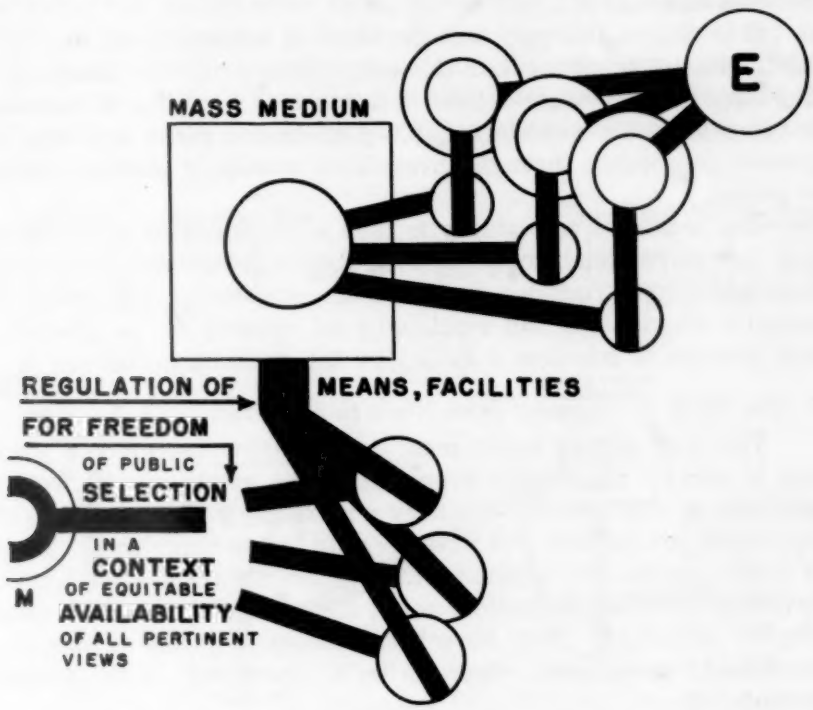

Figure 8

The interdependence of regulation and freedom in mass communication

Figure 8 illustrates this reasoning. An event of public concern, *E*, is discussed or represented by three sources whose views can be made available to the public only by a mass medium, say a broadcasting network. The Federal Communications Commission exercises some control over the means of transmission to promote use of these facilities in the public interest, and to safeguard equitable availability of diverse views as in a political campaign. Regulation

of the facilities is designed to assure that the public is free to select and discuss all pertinent views in a representative context.

Lacking an understanding of the place of controls and freedom in communication the distinctions become confused. If freedom can be claimed to pertain to the vertical axis of private use of facilities, it can mean the freedom to distribute, suppress, or monopolize at will. Such "freedom" is a mutilation of the requirements of self-government through freedom of access, along the horizontal axis, to all communication products pertinent to public decision-making.

It is only in this way that the issue of censorship can be dealt with without throwing out the baby along with the bathwater. Regulation over *private actions* and access to *facilities* is essential in order to assure *public availability* of *diverse views* and thus to prevent censorship through unregulated monopoly power, private or public.

The aspect of availability is thus a fruitful area of research into the institutional, social, and legislative theory and practice of communication. Included here are investigations attempting to measure distribution and availability of communication products, and freedom of selection (choice) by the communicating agent.

7. *The Form of Signals; from Style to Statistics*

The transmitting agent must be formally structured in some way to carry a signal with representational, symbolic, or affective qualities, in other words, to convey a message. Formal qualities of statements are diverse, and have been studied in many ways. Some of these qualities are grammatical, rhetorical, graphic, or phonic structure, style, organization, color, dimensionality, design, complexity, and so on. They have been studied in terms of esthetic, functional, sales, and other criteria concerned with formal methodology.

Research into the formal aspects of large numbers of signals also includes mathematical and statistical approaches involving studies of probability of occurrence, frequency, redundancy, internal context, sequence, etc. Recent advances in the theory and mathematical treatment of information, developed mostly for purposes of electronic communication and automatic control by feedback, come under this heading. Shannon (17) constructed a model of a general communication system applicable to the mathematical theory and treatment of information. Figure 9 compares Shan-

non's diagram with the same communication system as portrayed on our general graphic model.

The problem of information theory has two aspects: selection and transmission. Information is defined at the source as the measure of one's freedom of choice in selecting a message. As freedom of choice increases, the probability of picking a certain message, something one already knows, decreases. The unknown, uncertain, improbable carries greater information value than the probable, commonplace, or easily predictable. Information at the receiving end, on the other hand, is something that reduces uncertainty. Random noises in transmission, however, add the kind of uncertainty that is undesirable because they did not come about through the sender's freedom of choice, and, instead of increasing information value, increase uncertainty about the messages at the receiving end.

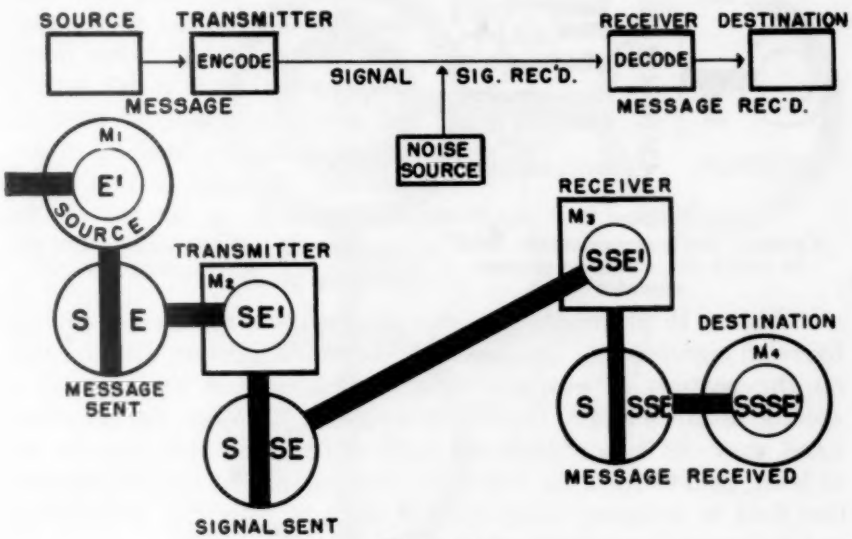

Figure 9

Shannon's diagram of a general communication system (top) compared with the progress of a signal in the same system as illustrated on the graphic model

Suppose now that the message, *SE* sent by the source has a certain formal information value in terms of freedom of choice at the source. (See Figure 9.) But in the course of coding and transmission the signal deteriorates; it picks up spurious, random signals—"noise"—and comes out *SSSE*. The task of information theory is to subtract this undesirable element from received signals,

and to obtain maximum dependability and economy (through reduction of noise, error, redundancy) in coding and in the use of channels.

So while information theory as such is not concerned with perceptual, cognitive, representational, or semantic aspects of signals (with content in the usual sense), it *is* concerned with the formal characteristics of signal systems as related to problems of transmission and selection. Information theory may be pertinent, therefore, to problems of *availability* (selection) and *context,* as well as of *form* in communication.

8. *Context: Composition of the Communication Field*

Context in our scheme refers primarily to the nature and composition of the communication field, in space and time, in which a certain event is selected for perception. (The internal composition of a signal or message has been classified under *form;* the physical and social setting of perception and/or reaction comes under the heading of *situation.*) Context, in this sense, is therefore an aspect of the perceptual dimension of the graphic model.

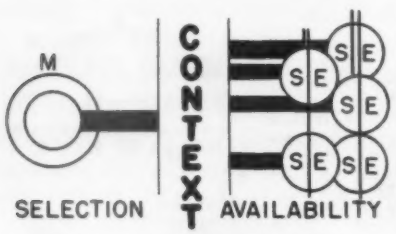

Figure 10
Context: the communication field in which the selection process operates

Figure 10 illustrates how studies of context can have a double-barreled significance. On one hand they shed light on distribution, on the pattern of availability of communication products in a specific instance and in regards to a specific message. On the other hand, they can help explain the nature of the selection process, or, at least, demonstrate the role of the composition of the communication field in bringing about certain ways of selecting, perceiving, and understanding statements.

9. *Content: Study of All Relationships as Reflected in the Statement*

Any nonrandom communicative transmission is a signal. This means that it must be occasioned by some systematic use of some means. Therefore it reflects, represents, symbolizes, refers to, or corresponds to some pattern in some source. Thus every signal has *content,* even if one cannot tell its meaning at a certain instant. So on our graphic model, *S* never stands by itself, unless it signifies

noise; it is always coupled with *E*, the representational, content qualities of the signal, to make up the communication product *SE*.

Content analysis is actually the investigation of a relational pattern, of the sum total of the attributes of all other aspects reflected as that quality of a statement which is not identical with its form. Strictly speaking, therefore, content analysis focuses not on how statements are perceived by certain individuals or groups, but on "built-in" qualities of communication products as they reflect aspects of the communication sequence of which they are a part.

So content can be studied from the point of view of any or all aspects and elements in our model. This is illustrated on our

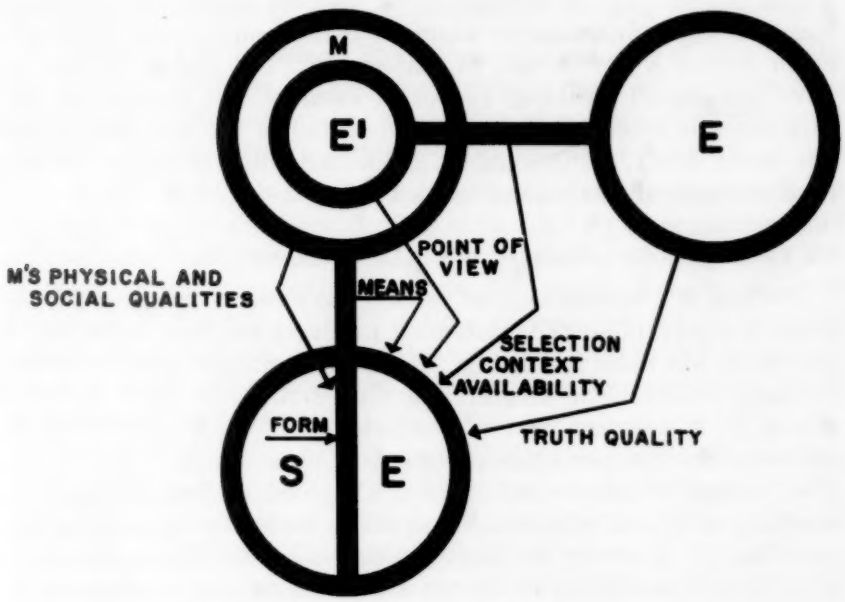

Figure 11

Any aspects of the communication process may be studied from the point of view of any other aspect. Content (E part of SE) might reflect all other aspects as "built-in" qualities inviting study

graphic diagram on Figure 11. We may find in our study of the *E* properties of statement *SE* that there are "built into" them some

overt or implicit points of view, assumptions, etc., that were part of *M*'s way of perceiving events. These may even reflect *M*'s selection process, and the context of availability in which it operates. The situation in which *M* reacted, and the means he used to produce the signal, not only fashion its form but also affect its content qualities.

On the other side of the diagram, the content properties of statements may be related to the events that occasioned them. We may investigate content from the point of view of representational or symbolic adequacy, or correspondence; in other words, appraise its truth qualities.

Simple frequency counts, although they involve identification of content usually from the standpoint of form, would usually fall under the heading of availability or context study. On the other hand, semantic analysis, for example, focuses on content, especially on *M* versus *E* orientation of statements. The former is said to have intensional meaning, rooted in assumptions, inferences, etc. The latter is extensional orientation rooted in the world of events (or sense data). Philosophical, social, scientific criticism usually involves content analysis of some kind.

10. *Consequences: Study of Over-All Changes*

When *M*'s communicative reaction to event *E* produces *SE*, or when the perception of a statement produces another statement, a new event has come into being. This new event, the communication product, makes some irreversible contribution to some chain of events as it becomes part of that chain. If this contribution is measured by the yardstick of intent or objective inherent in the presentation which evoked it, it is classified as "effectiveness in reaching a desired objective," and comes under the heading of the *reaction*. If, however, we study the over-all contribution, the tendency of communication to change a state of affairs or the state of some system independently of any preconceived objective, then we are dealing with *consequences* in terms of our model.

Robert K. Merton provided an example of this type of analysis in his study of *Mass Persuasion* when he contrasted the effectiveness of the Kate Smith war bond "talkathon" with some of its possible over-all *consequences* in his last chapter on "The Moral Dimension."

Consequences may be studied through physical, social, or psychological analysis; they may be viewed in reference to changes in any or all aspects of communication over a period of time. They must be appraised, however, in the light of some normative concepts.

11. *Value Orientation: Some Normative Concepts Illustrated on the Model*

The theory of communication can either find a scientific value orientation or remain the elaboration of manipulative techniques. A value-conscious approach is based on some normative standards and criteria. One possibility for a theory of communication is to formulate such value standards and criteria in terms of changes in knowledge. The following series of basic propositions about communication lead us to a value-oriented concept of knowledge.

Leading a fully human life is the principal goal of man. Making a human living is his principal activity. Both are possible only in a society; both require the production of goods and rendering of services by and through which we live and make a living.

A full human being is thus a member of the species Homo Sapiens living in a society. Society is the pattern of productive and service relationships which create the conditions of human life and welfare. Social production involves the cooperative handling of materials on the basis of information; services involve the handling of information itself. Society is, therefore, cooperative living and labor through communication. It exists for the purpose of maximum human development.

Public knowledge is acquired through social communication, and describes the state of a social communicative system. The ultimate value of human welfare yields measures of value in social communication and of validity in public knowledge. Ideal social communication in terms of human welfare yields the greatest increase in valid public knowledge.

Knowledge is a communicative quality of man's social relationships with his world of events—of the horizontal dimension of our model—and a consequence of his communicative actions and products—represented on the vertical axis. The task is now to specify some normative characteristics of knowledge in terms of ideal communication.

Figure 12
A conceptual application of the model to illustrate a definition of knowledge as the result of ideal social communication

Our model, as shown on Figure 12, suggests some normative aspects of knowledge, and forms a triangle defining a value-oriented concept of knowledge in communication terms. Along the horizontal side we find the perceptual dimension relating the individual, with his points of view and assumptions, to the world of events (and statements). The ideal along this dimension may be expressed as *valid perceptions freely selected from a representative context of all pertinent evidence.*

On the vertical axis we have added "beliefs" to "means" as a controlling aspect in communicative actions; the hypotenuse represents "truth" as the ideal quality relating statements to events. Reading along these two sides we find the ideal as *true beliefs reflecting valid points of view and presented through effective means and forms.*

Human welfare is, of course, the criterion of validity, and the ultimate value which makes freedom, truth, and controls necessary. Its specific place on the model is along the vertical dimension, as it is the controlling value, or belief, that regulates man's ideal social actions and communications. Thus it is with human welfare as the paramount goal and controlling value that, contracting the above propositions for a briefer statement, we formulate our normative concept of knowledge in communication as *true beliefs freely acquired and clearly presented.*

In a self-governing society all citizens benefit by, and are responsible for, the promotion of public knowledge on such terms. Each advance in standards and expectations of human development imposes upon the major communicative institutions of society increasing demands for the freer acquisition and more effective presentation of a truer set of beliefs. Such have been the historic ideals, and growing functions, of democratic government, science, and art.

Government in a democracy is responsible for safeguarding the freedom of selection and the equitable availability of diverse views and evidence in matters of public concern. Otherwise there is no self-government, only manipulation of citizens, or as more elegantly phrased, "engineering of consent."

Science is the systematic examination of the truth quality of statements and beliefs in the light of reason and freely acquired independent evidence. It arises in response to real human needs, and it attempts to serve them by forming truer statements and more valid ways of perceiving. Standards of validity evolve through historical and scientific processes; they are expressed in terms relating value to human welfare, and are embodied in the governing principles of democratic society.

Art also serves real human needs. It is the creative effort to express, by the most moving and powerful means, true and significant propositions perceived from a valid point of view. The "beauty," the "emotional quality" of art, (not wholly foreign to science!), rests in the excitement of *discovery* upon the perception of a convincing, true, significant, and valid statement. Art sensitizes us to the perception of human potentialities whose development society and science make possible.

Government, science, and art thus complement one another in communication as they function to make knowledge freer, beliefs truer, and truth more believable.

It might be argued that the discussion of such broad concepts is not the task of model-building in communication theory. But if that is so, the study of communication must abandon hope of any scientific value orientation as an organized discipline, and remain torn by particular rationales behind specific research techniques. For scientific value orientation does not rest in technological efficiency on behalf of unscrutinized objectives; it rests in the concern with over-all human needs and consequences behind all attempts to organize a field and map out an approach for further study.

This paper has not presumed to furnish a blueprint, but hopes to stimulate the search for one. It has attempted to present a unified approach to diverse aspects of the study of communication in terms of a model that might serve the triple functions of description, classification and discussion. Above all, it tried to provoke the kind of model-building in communication theory which can help us communicate about specialized technical matters and broad conceptual issues on related terms. If it succeeds in that, it has achieved its major purpose of helping to bridge that unnecessary gap between "arid equations" and the world of urgent questions.

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FURTHER STUDIES OF THE USE OF TELEVISION FOR UNIVERSITY TEACHING

- L. P. GREENHILL
- C. R. CARPENTER
- W. S. RAY

Last year the Instructional Film Research Program at Pennsylvania State University published a report on the use of closed-circuit television in university teaching. This article presents further results of the study, covering the second year of experimentation. L. P. Greenhill is research associate in the Department of Psychology and associate director of the Instructional Research Program at The Pennsylvania State University. C. R. Carpenter is head of the Psychology Department and director of the Instructional Research Program. W. S. Ray is associate professor in the Department of Psychology and special advisor on experimental design to the Instructional Research Program.

THE RESEARCH program on televised instruction[1] now in its second year at the Pennsylvania State University has as two of its principal objectives the following:

1. To determine whether or not good classroom instruction can be extended effectively to large numbers of university students by the use of closed-circuit television.

2. To attempt to improve the general quality of university teaching through the use of television both as a mode for presenting instruction and as a means for observing and studying instruction-learning processes.

In approaching these problems four research areas have been outlined. These may be summarized by four concepts: effectiveness, appropriateness, feasibility, and acceptability.

Effectiveness is a matter of primary importance. It relates to the relative effects on students' achievement of instruction presented by various methods with and without television. It is

[1] This research program is supported by a grant from the Fund for the Advancement of Education.

believed that even with greatly increased college enrolments, a decrease in instructional effectiveness cannot be tolerated. Rather an improvement in effectiveness of instruction is greatly to be desired, in terms of academic achievement and personal growth, and development.

Appropriateness relates to the question of the suitability or lack of suitability of television for presenting various kinds of instruction, for instruction in different curriculums and courses or even in parts of courses. It relates also to the use of television in laboratory instruction, for the administration of tests and other specialized uses. Included in this concept is the idea of the reciprocal adaptation of courses to television and television to courses in order to maximize teaching and learning.

Feasibility includes problems of capital, operational and maintenance costs, and personnel requirements. In this area Penn State has made a basic approach by using relatively low-cost vidicon television equipment, by using standard classrooms with minimum adaptation for originating and receiving the televised instruction, by employing student personnel for engineering and camera operation, and by insisting on a teacher-centered approach to the development of instructional presentations over the television systems.

Acceptability, finally, includes studies of the acceptance of televised instruction on the part of students, faculty members, administration, and the university's larger constituency.

RESEARCH PROJECTS—SPRING 1955

Emphasis is being placed on an experimental approach to the solution of defined problems. During the first semester's research in the spring of 1955 the principal comparisons made were between the usual methods of presenting instruction and methods of presenting the same unmodified instruction via television. These comparisons were made in three different courses: General Psychology, General Chemistry, and Psychology of Marriage.

A detailed account of this work has been published[2]. Briefly the general results were that in 12 out of 13 tested comparisons no significant differences in student achievement were found.

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[2] CARPENTER, C. R.; GREENHILL, L. P.; and others. *An Investigation of Closed-Circuit Television for Teaching University Courses.* Instructional Television Research Project Number One. University Park: Instructional Film Research Program, Pennsylvania State University, July 31, 1955. 102 p.

RESEARCH PROJECTS—FALL 1955

Nine courses were taught over closed-circuit television during the fall semester of 1955. These included: Air Science, General Chemistry (2 sections), Business Law, General Psychology (2 sections), Psychology of Marriage, Principles of Economics, Music Appreciation, Introduction to Education, and General Speech.

Twenty-four instructors and 2,400 students were involved in the various experiments during the semester. In all, about 17 experiments were conducted. Several of these included comparisons of televised and face-to-face instruction, but in the main they dealt with different and more detailed problems. It should be noted that some of the same problems were studied in the context of several different courses.

The problems may be classified under four main headings:

1. The effects on student achievement of varying the size of the classes in the TV receiving classrooms (range studied: 15 to 200 students).

2. The effects on achievement of the use of assistants to supervise television classes.

   a. Amount of supervision (range studied: none to full-time supervision).

   b. Kind of supervisor—student peer, seniors, graduate assistants, faculty.

3. The effects on students' achievement and attitudes of several different patterns of instruction designed to provide for students' questions, discussion, and problem solving:

   a. Two-way microphone system.

   b. Thirty-five minute lecture plus 15-minute discussion period led by graduate assistants.

   c. Two lectures a week followed by a full period of discussion and problem solving led by graduate assistants.

   d. Rotation of groups into and out of the TV origination room where the principal instructor presented the instruction.

4. The use of a "free-choice" situation as a measure of students' attitudes towards the acceptance of televised instruction.

It would seem that closed-circuit television provides unusual opportunities for educational research. In a given course it is

possible to assign the students randomly to groups, give them all the same instruction simultaneously, by the same instructor, and at the same time vary the methods of treating comparable groups. For example, such problems can be attacked as class size, amount of supervision, opportunties for questions, the use of incentives, assigned or voluntarily chosen supplementary study, personal counseling.

Comparisons between methods of presentation are more complicated because they involve random assignment of students across course time sequences, but this can be achieved by modified registration procedures. Furthermore, an experiment can be conducted with one set of variables, for say a month, and then after an examination and the reconstitution of groups, another experiment can be conducted in the same course.

SUMMARY OF RESULTS—FALL 1955

Comparisons between face-to-face and televised instruction. Comparisons between face-to-face and televised instruction were possible in two courses: General Chemistry (2 sections) and Business Law. No significant differences in achievement were found. In other words, no differences in effectiveness between face-to-face and televised instruction were detected.

In Chemistry it was also possible to compare the achievement of the students who sat in the front five rows of the lecture-demonstration auditorium with that of the students who sat in the second five rows and the third five rows. No significant differences were found between these randomized groups.

Class size comparisons. The problem of the size of classes in the television receiving rooms relates to the physical facilities of a university which usually include rooms of various sizes. It would be very desirable if large groups and small groups could be taught via television with equal effectiveness. This question was studied in five different courses: Air Science (ROTC) (range: 20 to 200 students), Chemistry (2 sections) (range: 14 to 43 students), Economics (range: 15 to 45 students), Music Appreciation (range: 15 to 92 students), Psychology (2 sections) (range: 21 to 150 students). With one exception, no significant differences in achievement were found in these comparisons.

The one exception was in Music Appreciation where, on the first examination in the course, one group of 40 students had a

significantly higher mean achievement score than the other groups. On the second examination no significant differences were found between this group and other comparable groups.

Amount of supervision. The amount of supervision in the several television receiving rooms was varied in the Psychology course during the second five weeks of the semester. Some classes had no supervision except for a graduate assistant who recorded attendance and then left the room. Other classes were supervised for part of each class period (one assistant monitored several rooms). Finally, some classes had full-time supervision. During this part of the study the graduate assistants merely kept attendance records, acted as observers and maintained a "reasonable" level of discipline. They were also rotated among the groups.

Comparisons of the achievement scores of the groups revealed no significant differences as a result of these varied treatments of supervision or "monitoring."

Kind of supervisor used. During the first semester of the project faculty members were used as observers and supervisors in the TV receiving rooms. Graduate students were used as teaching assistants in most TV classes during the fall semester of 1955. However, in the Air Science course it was possible to conduct an experiment in which proctors of varying status were used in the different receiving rooms. These rooms were supervised: (a) by a staff instructor, (b) by a cadet officer (senior), (c) by a student selected from the class, and finally, (d) one classroom was unproctored. Comparisons of students' mean achievement scores among all these groups revealed no significant differences.

It should be noted here that students in the ROTC classes are accustomed to discipline in their military classes, and thus these situations may not be typical of other college classrooms. For example, in one course, Music Appreciation, it was not possible to provide a teaching assistant in each room at all times. A staff member recorded attendance in each class, then left. Many students in this course reported on an attitude survey that they were disturbed by other students who talked during the playing of musical selections. An effort was made to reduce talking by an appeal to students to develop an honor system and to exercise self-discipline.

During the current semester (spring 1956) most television classes are supervised either by seniors or by graduate assistants who perform a variety of tasks.

The use of two-way communication system. One approach to the problem of providing for questions from students in TV classrooms is to install two-way communication between these and the origination room. In the Air Science course during the final five weeks of the semester it was possible to make comparisons between the achievement of students in two rooms equipped with microphones and the achievement of students in two rooms not so equipped.

From time to time during his presentation the instructor would pause and ask for questions. Students in the rooms with microphones would then ask questions which would be repeated and answered by the instructor so that everyone could hear them. Students asked a number of questions but comparisons of achievement scores of the groups showed no significant differences; nor were there differences in general attitude towards the course as a result of opportunities for two-way communication. This method will be given further study in other courses.

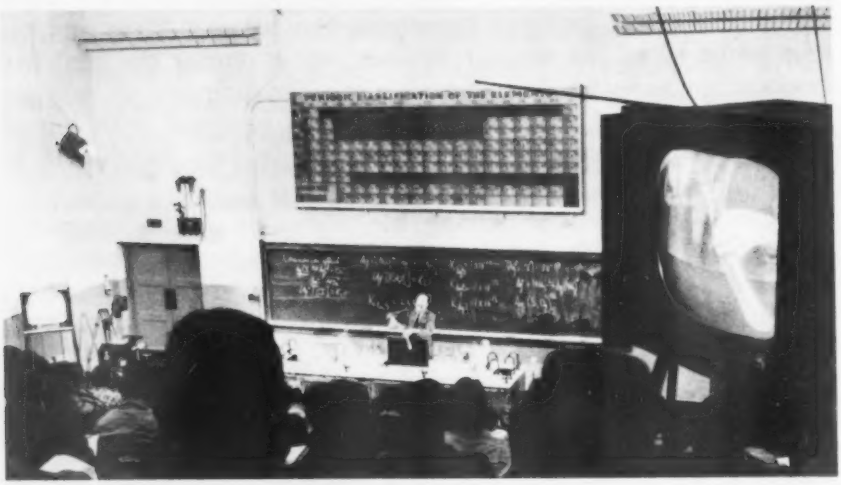
Thirty-five-minute lecture followed by 15-minute discussion. During the last five weeks of the General Psychology course it was possible to make experimental comparisons between several treatments which involved a 35-minute lecture presentation followed by a 15-minute discussion period used in the following ways:

1. Some groups of students had a 15-minute discussion led by graduate students. The principal instructor provided some material to be used for "starter" questions if necessary.

2. Some groups by means of TV observed and listened to a discussion conducted by the principal instructor with a group of eight students in the origination room. This observation of discussion was called "vicarious" discussion.

3. Other groups were given no opportunity for such discussion. These students could study their notes or textbooks or leave the classroom.

Analysis of results indicated no significant differences in academic achievement; nor were there differences in general attitude toward the course as indicated by a rating of level of appreciation of the course. However, there was a highly significant difference ($p<.01$) in attitude toward the discussion arrangement. The groups which were given an opportunity for direct discussion were much more favorable toward this discussion arrangement than were students who "listened in" or did not have any discus-



General chemistry auditorium. During the spring 1956 semester, a simple TV camera is being used to televise demonstrations to six receivers located in the auditorium so that all students may obtain a close-up view of the demonstrations.

Small origination classroom during the televising of a learning experiment in general psychology. There are no students present in the origination room during the presentation of this course.

A professor of economics makes use of self-prepared graphic materials during a televised presentation in the economics course. Twenty students are present in the origination room during the presentation of the instruction.

Typical television classroom during presentation of learning experiment in general psychology. Two 24" receivers are provided in classrooms of this size which seat approximately fifty students. The receivers are placed on the window side of the room to avoid reflections.

sion. This study was repeated in two different class sequences with similar results.

A non-experimental comparison was made in the Economics course. For the first half of the semester the instructor presented a 40-minute lecture each day which was followed by a 10-minute discussion and problem-solving period led by graduate students. The principal instructor visited a different class each day during this 10-minute period. During the second half of the semester the principal instructor gave two 50-minute lectures a week over the television system and a third 50-minute period was used for discussion and problem solving under the leadership of graduate assistants. A poll of student preferences indicated that the latter pattern was preferred over the former in proportion of 7 to 3. It was believed that the longer period gave a better opportunity to work on problems or to develop discussion to a fruitful stage.

Rotation of students into and out of the TV Origination room. The professor who taught the Business Law course preferred to have a large audience in his origination room. In this course it was possible during the first four weeks to have 50 students continuously in the origination room, 50 continuously in a receiving room, while two other groups spent two weeks in the origination room and two weeks in receiving rooms. Comparisons of achievement revealed no significant differences among any of the groups.

During the next four weeks the TV-room and originating-room groups changed places and the other two groups continued their fortnightly rotation. Thus at the end of eight weeks comparisons could be made between groups that rotated fortnightly or monthly. Again, no significant differences in achievement were found.

The use of a "free choice" as an indication of students' attitudes towards the value of televised instruction. Some difficulty has been experienced in obtaining what are considered to be valid indications of students' attitudes towards televised instruction when attitude questionnaires are used. A study of student responses indicates a confounding of attitudes toward the instructor, toward the course, as well as toward the methods of presentation. Furthermore, unless students have experienced the same course from the same instructor by both methods—face-to-face and via television—it is difficult for them to make a judgment about which is better. Also, doubts are often raised about the validity of verbal responses.

In the General Chemistry course an experimental design was developed which permitted students to make a free choice after periods of instruction via television and face-to-face. This experiment was replicated in two different class sequences. Since the procedures and results were identical only one sequence will be described here.

In this class sequence 312 students enrolled for the lecture-demonstrations were randomly divided into two equal groups. One group received direct instruction in the origination auditorium for the first five weeks of the semester while the other group simultaneously received the same instruction via television in five smaller classrooms in a different part of the building. The laboratory and recitation periods were not televised.

After an examination the groups exchanged places for a second five weeks. Following a second examination all 312 students were brought into the auditorium where the instruction was originated, and were randomly assigned to seats. After two lecture-demonstration periods under this condition they were told that they would be free to retain their present seats or move to a television room. This free-choice opportunity was given for three periods. Prior to the last free-choice period the students were told that on the next class day the seat and room they chose would be permanent for the remaining four or five weeks of the semester.

The third period, then, was an important choice point which required definite action. Unfortunately circumstances did not permit of the prior collection of verbal attitude responses which could be validated against actual behavior. This step is being taken in two courses of the current semester.

There was much speculation at the time as to how many students (if any!) would elect to go back to the television receiving classrooms.

By actual count 109 students went to TV rooms on the first free-choice day, 106 on the second day, and 104 on the final free-choice day when the choice became permanent. In total this constituted about one-third of the students. If the 18-row classroom is divided at the ninth row it can be seen that slightly more than 50 percent left from the rear half of the room and nearly 20 percent left from the front half. (Figure 1.) The choices were very stable for the three free-choice days, with only a few students vacillating back and forth.

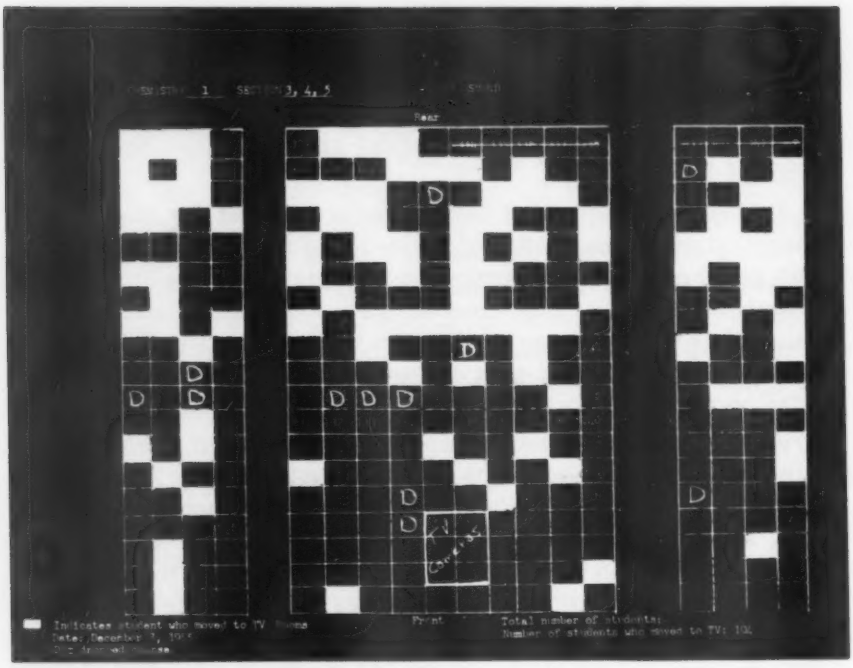


Figure 1

Plan of the general chemistry auditorium. The white squares indicate seats vacated by students who preferred to receive the course on television during the final five weeks of the semester.

The proportions were almost identical in the second-class sequence of General Chemistry.

Beginning about two weeks after the final free-choice day interviews were conducted with samples of students drawn from (a) those who left from the rear of the auditorium, (b) those who remained in the rear, and (c) those who left from the front. These interviews were conducted out of class on an individual basis by an experienced interviewer who endeavored to probe for reasons which determined the choices made by students.

The reasons given by students who chose to receive the instruction by television were:

1. They thought that they could see and hear better.
2. There were fewer distractions.
3. They claimed that their attention was directed by the TV cameras and screen to what they should see.

4. Room conditions and seats were more comfortable in the smaller TV receiving rooms.

The reasons given for remaining in the large auditorium were:

1. Color in the demonstrations was considered important.

2. Smells produced by chemical reactions were considered important.

3. The blackboard was visible for longer periods, even after the professor had progressed to a new topic.

4. Some expressed a vague feeling that it was better to stay in the large auditorium even if the seats assigned were at the rear of the room.

5. A few expected to be moved up to the front of the room.

The students were also asked how certain they were that they had made the right choice. The students in the TV rooms were more certain than were those who remained in the rear half of the large auditorium. This may be an indication of the fact that only the students who had definitely positive attitudes towards televised instruction moved out of the large auditorium, whereas those who remained included, in addition to those who might be strongly negative, a proportion who were neutral or somewhat ambivalent. Most of the attitude questionnaires in the various courses have indicated a fairly large neutral group.

Other problems. Two other problems were investigated. During the first semester (spring 1955) many students in the Chemistry course reported that note-taking was a problem because the cameras did not remain focused on the blackboard notations after the instructor had commenced to develop a new topic. In an attempt to remedy this problem mimeographed lecture outlines (one to two pages per lecture) were provided for all students in the course during the semester under review (fall 1955). In response to a questionnaire about the difficulties of note-taking in this course, most students indicated "fairly easy," and there was no marked difference between the responses of the students in the large auditorium and those in the TV classrooms. Prepared notes seemed to solve the problem.

The question of viewing distance from a TV receiver was also studied to a limited extent. In general, a standard has been adopted which is based on some earlier research by the Instructional Film

Research Program.[3] This standard requires that no student be seated further than 12 screen widths from a TV receiver. This amounts to 21 feet for a screen 21″ wide. The 24″ receivers have screens 21″ *wide*, or 24″ on the diagonal.

However, in the General Psychology and Air Science courses the enrolments made it necessary to use a large auditorium as a TV receiving room. One hundred fifty to 200 students were randomly assigned to seats in this room. Four 24″ receivers were placed across the front of the room. In each course approximately 100 students were seated within the 21-foot viewing distance mentioned above. The additional students were seated in a "zone of possible disadvantage" which extended from 21′ to 35′ from the TV screens. A careful check was made on the academic achievement of these groups, but no significant differences were found. However, it is possible that in both of these courses, no very strong demands were made on visual learning.

During the current semester (spring 1956) the large room has been rearranged and six receivers have been provided so that the 12-screen-widths standard can be maintained as a maximum viewing distance.

MEASUREMENT

In view of the number of nonsignificant differences obtained a question might be asked about the sensitivity of the achievement measures used in the various experiments. In other words, it is possible that there are differences resulting from some of the treatments but the tests are failing to measure them.

In practically all of the courses under study, objective tests were used. Tests were of a type generally employed in the evaluation of student achievement in university courses or in educational research. They were usually prepared by the professors in charge of the courses, although in some instances they are prepared by several members of a department working as a group. Assistance was also provided by members of the staff of the Instructional Research Program.

A special effort has been made to achieve adequate reliability values by developing tests of satisfactory length and by the avoidance of ambiguity in the wording of items. Furthermore, in most courses, an effort has been made to include items which cover

[3] ASH, PHILIP. *Optimum Physical Viewing Conditions for a Rear Projection Daylight Screen.* SDC Technical Report 269-7-37. Instructional Film Research Program, Pennsylvania State University. Port Washington, L. I., N. Y.: Special Devices Center. Oct. 12, 1953. 17 p.

material presented in the lectures in addition to that available in the textbooks. Where appropriate, problem-type items are included which are intended to test knowledge and application of principles as well as recall of detailed facts.

Special efforts are being made to develop tests for measuring learning which results from the visual presentation of material.

WORK IN PROGRESS DURING THE SPRING 1956 SEMESTER

During the spring 1956 semester, 12 courses are being presented over television with a total of 14 sections: General Psychology (2 sections), Introductory Accounting, Principles of Economics, General Speech, Business Law, Political Science, Sociology, Music Appreciation, Air Science, Introductory Course—Education, General Chemistry (2 sections), and Electrical Engineering. These are principally introductory courses in which enrolment pressures are high. Some 3300 students are involved and there are 38 hours of televised classes each week. The problems under study may be summarized briefly as follows.

1. *Adaptation.* During the first semester of the project courses were televised with little or no adaptation to television. In the fall 1955 semester instructors in various courses began to explore the possibilities of making use of the potentialities offered by television for presentation of instructional materials. It was apparent that much could be done in this direction without making a classroom presentation into a commercial "show." During the current semester more systematic efforts are being made to capitalize on the potentials of television for presenting close-ups, demonstrations, short films, guest speakers, discussion panels, still pictures, slides, diagrams, and other graphics. Some instructors are originating their presentations from a small classroom with no students present; others have 15 or 20 students in the origination room; still others prefer a large origination room with 100 to 150 students.

2. *Teaching assistants in TV classrooms.* Efforts are being made to use teaching assistants more effectively in the TV classrooms. Their duties may include: taking attendance, leading discussion sections, answering questions, proctoring examinations, writing examination questions, correcting examinations, counseling students individually or in small groups out of class, keeping careful records of what is taught, systematically observing student

behavior, and meeting with the principal instructor to discuss teaching methods and to report student reactions to the presentations.

3. *The free-choice technique* is being extended to two other courses—Political Science and Business Law. In the Political Science course approximately 220 students were given five weeks of instruction in TV receiving rooms followed by five weeks of instruction in a lecture auditorium. Following this the students were asked to express their preference for televised or face-to-face instruction for the remainder of the semester. These verbal preferences indicated that 51 percent would prefer televised instruction and 49 percent face-to-face instruction in the auditorium. A week later the students were told that they would have a free choice between instruction in the TV receiving rooms and face-to-face instruction in the auditorium. This free choice was repeated on two successive class periods. The actual choices showed that 71 percent of the students went to the TV receiving rooms and 29 percent to the auditorium where the instruction originated for the remainder of the semester. A follow-up study is being made of the students whose actual behavior was different from their verbal expression of preference.

In the Business Law course after eight weeks of instruction in which groups of students rotated every two weeks between the TV receiving rooms and the lecture auditorium the students were asked to express a verbal preference for the remainder of the semester. Forty-two percent indicated a preference for television, 54 percent preferred face-to-face instruction, and 4 percent indicated no preference. A week later when an actual free choice was given 47 percent of the students went to the TV classrooms and 53 percent to the lecture auditorium.

4. *Additional courses are being sampled for appropriateness* (four new courses have been added) and are in exploratory periods preparatory for experimentation.

5. *Other ways of using TV* are being investigated, for example, as a means of fully utilizing large auditoriums, by televising the demonstrations through four or six receivers situated in the same room.

6. *Several equipment problems* are being studied. Comparisons are being made among several methods of sending the television signals to the receiving classrooms. Work is being done to deter-

mine the suitability of low-cost television cameras (Dage Models 60B and 101) for classroom use. Low-cost equipment for making kinescope recordings is under development and its application is being planned.

It is expected that a complete report on these and other phases of the Instructional Research Program will be available during the fall of 1956.

AN EXPERIMENTAL COMPARISON OF "LIVE" AND FILMED LECTURES EMPLOYING MOBILE TRAINING DEVICES

- H. H. SHETTEL
- E. J. FAISON
- S. M. ROSHAL
- A. A. LUMSDAINE

This article reports an Air Force study which was made to investigate the feasibility of using filmed recordings of familiarization lectures, given to mechanics transitioning to new types of aircraft. The study was conducted as a part of a U. S. Air Force program of research on the utilization of audio-visual media under the direction of A. A. Lumsdaine and S. M. Roshal of the Air Force Personnel and Training Research Center. H. H. Shettel is now with the Perceptual Development Laboratories in St. Louis, and E. J. Faison is now with Needham, Louis and Brorby in Chicago. The opinions and interpretations given by the authors are their own and are not to be construed as representing official views of the Air Force.

INTRODUCTION

THE CONSTANT and rapid development of new equipment makes it necessary for the Air Force to continue the training of its personnel in operating and maintenance procedures long after the completion of formal job training. To meet this need the Air Force has evolved the concept of mobile training teams or detachments which supply the necessary transitional training wherever it is needed. These teams rely heavily on various kinds of training devices, such as animated panels, charts, symbolic diagrams and operating mock-ups.[1] Frequently these devices are quite complex, requiring skilled instructors to use effectively. Further, they are expensive to design and manufacture and cumbersome to move from base to base. They represent a considerable investment in Air Force time, money and manpower.

[1] A more detailed description of these and other devices is contained in AFPTRC Research Review No. TR-54-1, *The Relative Effectiveness of Training Aids Designed for Use in Mobile Training Detachments*, by Robert A. Swanson.

With a view toward possible reduction in the complexity and diversity of mobile trainers, a study was undertaken at the Training Aids Research Laboratory by Swanson and Aukes[2] to compare the training effectiveness of several different kinds of devices presently used by the Air Force. Premilinary results from this study did not indicate any teaching differences among the six devices tested when these were used as visual aids in classroom instruction. These results suggested that differences in learning from "live" training presentations and filmed, or "canned," presentations employing the same devices might be less than had previously been anticipated. The relative economy and simplicity of using film as compared to even the simplest trainer pointed up the need for determining the adequacy of filmed presentations as supplements to, or replacements for, other forms of mobile training equipment. The present study, also done at the Training Aids Research Laboratory, was designed to investigate this problem.

DESIGN OF THE STUDY

In order to achieve comparability with the Swanson and A kes study,[3] the materials for this experiment consisted of filmed versions of the lectures for the fuel and rudder systems of the B-47 using three devices: (a) an operating mock-up, (b) a nonoperating mock-up, and (c) charts.[4] With the exception of the use of close-ups in the films, the "live" version and the filmed version of each lecture were substantially identical. Both were given by the same instructor. The camera angle employed approximated the view which a trainee might have had if he were ideally situated during a "live" classroom presentation.

The present study was integrated into the latter half of the Swanson and Aukes study so that similar groups of subjects could be used under parallel physical conditions. Insofar as it was possible, comparable groups were run simultaneously, i.e., while one group was watching the fuel-system film employing the operating mock-up, another group was receiving a lecture on the fuel system employing the same operating mock-up and lecturer.

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[2] SWANSON, R. A., and AUKES, L. E. *Evaluation of Training Devices: B-47 Fuel, Hydraulics, and Rudder Power Control Systems* (In press).

[3] In the Swanson and Aukes study six different kinds of training devices were used for three B-47 systems—fuel, hydraulics, and rudder power control. The accompanying lecture was essentially the same within each system, regardless of the particular training device used.

[4] The nonoperating and operating models were mock-ups employing actual component parts of the systems. The charts consisted of two-dimensional drawings of the component parts, showing their interrelation with each other and with the complete system.

The subjects were 165 Air Force aircraft maintenance technicians.

All subjects were given a short, multiple choice pre-test on the fuel or rudder system before each presentation and a more complete multiple choice post-test on these systems immediately after each presentation. In addition, all subjects who were still available (48 percent) were tested again, six to eight weeks after experimental exposure, with the same post-test (hereafter called the "delayed test") to get a measure of extended retention.

Those subjects who received their original instruction from the film on the fuel system of the B-47 were divided into two groups for the delayed test. One group was given the delayed test with no additional instruction. The other group was shown the film for a second time prior to the administration of the delayed test. This "reshow" group was included to determine to what extent a film, when viewed periodically, can help maintain knowledge at a high level, and thus perhaps serve as a supplement to other forms of instruction.

The experimental design is presented in Figure 1.

RESULTS

Scores on the pre-test were at the chance level, indicating no appreciable knowledge of the systems previous to experimental exposure.

		PRE-TEST	Media	N FOR EACH GROUP: Post Test	Delayed Test
RUDDER CONTROL SYSTEM	NON-OPERATING MOCK-UP	✓	Lecture	19	6
		✓	Film	20	10
	CHARTS	✓	Lecture	24	9
		✓	Film	22	8
FUEL SYSTEM	OPERATING MOCK-UP	✓	Lecture	37	19
		✓	Film	21	12
		✓	Film	Film Re-show 22	16

Figure 1

Experimental Design of Film vs. Lecture Study

TABLE 1—MEAN, "t" and "p" VALUES ON POST-TESTS AND DELAYED TESTS FOR FILM VS. LECTURE COMPARISONS

	$\bar{x}$—Film	$\bar{x}$—Lecture	Diff.	"t"	"p"
Rudder Control System (Nonoperating Mock-Up)					
Post-Test	39.6	40.8	1.2	1.68	$.10 > p > .05$
Delayed Test	29.9	23.2	6.7	1.65	$.20 > p > .10$
Rudder Control System (Charts)					
Post-Test	38.8	43.7	4.9	2.11	$p < .05$
Delayed Test	25.9	30.4	4.5	1.7	$.10 > p < .05$
Fuel System (Operating Mock-Up)					
Post-Test	37.7	43.6	5.9	3.1	$p < .01$
Delayed Test	27.1	27.5	0.4	.....	.....
	Film Reshow	Film No Reshow	Diff.	"t"	"p"
Delayed Test	39.7	27.1	12.6	2.81	$p < .01$

The mean scores, "t" and "p" values for each experimental group on the post-tests and delayed tests are shown in Table 1. Examination of the results on the post-test reveals that for all

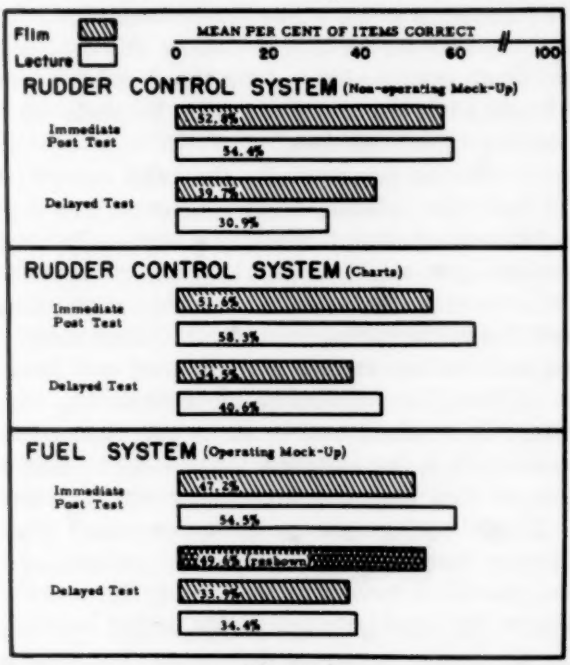

Figure 2

Percent Items Correct on Post-Tests and Delayed Tests for Film vs. Lecture Comparisons

three film-lecture comparisons, the lecture led to slightly greater learning than the film. Two of the differences, those for the rudder control system using charts and the fuel system using the operating mock-up, are reliable. The difference between the film group and lecture group for the rudder control, nonoperating mock-up, was not reliable.

The film-lecture comparisons on the delayed tests show no consistent pattern. None of the differences is reliable. However, those men who saw the film again just prior to the administration of the delayed test scored reliably higher than did the men not receiving a second viewing of the film. In fact, the scores for this reshow group were brought up to the level attained on the post-test for any group.

A graphic presentation of this data is shown in Figure 2.

DISCUSSION OF FINDINGS

The films used in this experiment, then, apparently taught the material a trifle less well than the "live" lectures as measured by multiple choice tests given immediately after instruction. However, after a delay of from six to eight weeks this original difference was lost, and those men instructed by the film apparently remembered (or forgot) as much about the systems as those men instructed by the "live" lectures.

It should come as no surprise that the delayed test scores were lower than the post-test scores, even to the extent of completely obliterating the initially reliable advantage had for the "live" lecture presentation. It does serve to point out, however, that the interval between the learning situation and the application of the material learned should be as short as possible, unless either serious decrements in learning can be tolerated or unless some method for retraining is provided.

Of course, it is realized that in many practical situations there must of necessity be a lag between "input" and "output." It was in recognition of this that the present design included a reshow film group. The advantage gained by this reshow group over the no-reshow group was highly significant, indicating that these films were an excellent means of returning the knowledge of the subject matter to the level obtained in the initial learning situation.

Actually, the mean raw score differences between the film and live lecture groups on the post-test were quite small, ranging from 5.9 items on an 80-item test on the fuel system to 1.2 items

on a 75-item test on the rudder control system. (See Table 1.) There is good reason to suspect that with improved film material such differences could be reduced. The films used in this experiment were limited by the fact that they utilized practically none of the techniques frequently employed to enhance the instructional value of the medium and were in a very literal sense a "filmed lecture." There was a minimum of editing and change of lens angle, and no use of labels, pop-in arrows, or animation. Also, these films were "tied" to a particular training device. In actual practice the instructional film could employ the kind of training material that seemed most appropriate to illustrate a given point. For example, location might best be taught by charts, while recognition might best be taught by an operating mock-up, and so on.

Advantages of Films

Training films, such as were used in this experiment, would have several advantages over mobile training devices.

1. *Economy.* In most instances films would be cheaper than trainers. This is particularly true where large numbers of trainers are required since it is much less expensive to duplicate film than to duplicate trainers. However, even where small numbers of trainers are needed, the cost of transportation, maintenance and associated personnel costs would result in higher cost per unit,

2. *Ease of use.* Even the smallest and lightest mobile trainers are large and cumbersome. The operating trainer for the fuel system of the B-47 weighs approximately 1000 pounds and requires considerable cargo space to transport from base to base. Setting up these trainers is also a problem, both in terms of the time involved and the need for special equipment to operate them. On the other hand, the film, projector, screen, and associated equipment are light and can be set up ready to operate in a matter of minutes.

3. *Man power.* Each mobile trainer requires a crew to operate and maintain it. The instructors must undergo considerable training before they are proficient with a new device. Films can, of course, be duplicated freely without tying up experienced man power.

4. *Reliability.* Once a good film is produced, it remains essentially the same. It does not become tired of repeating the same lecture over and over, nor does it suffer from any of the other factors which influence day-to-day lecture performance.

When considered in the light of the findings of this study, these inherent advantages of film over mobile trainers make them particularly suitable as supplementary forms of instruction in those instances where a time lapse between original instruction and application of the instruction would result in serious decrements in knowledge of the material (as was the case in the six- to eight-week interval between post and delayed test in the present study). For example, a print of the filmed instructional material could be left at each base after the mobile detachment had completed its training mission. Automatic, continuous look projectors could be installed in day rooms or other easily accessible places, allowing the men to "re-expose" themselves whenever they felt it would be helpful. Such projectors are operated by the flick of a switch and require no projectionist or separate screen.

CONCLUSION

It may reasonably be assumed on the basis of this study that important savings in money and manpower could be realized, with no loss in training effectiveness, and the possibility of a real gain in training effectiveness, by the application of well-designed films to supplement or replace mobile training devices such as are currently being used in Air Force transitional training programs.

FILM PRODUCTION IN U.S. COLLEGES AND UNIVERSITIES

• JACK C. ELLIS

This survey traces the development of film production in 100 of the largest U.S. colleges and universities and is based on the author's unpublished doctoral dissertation, Approaches to Film as an Art Form: A Handbook for College Teachers, *completed at Teachers College, Columbia University, 1955. Jack C. Ellis is assistant professor of film, School of Speech, Northwestern University.*

EVEN BEFORE the advent of 16 mm film, in 1923, motion pictures probably had been produced by at least a dozen universities, including Chicago, Illinois, Indiana, Iowa, Michigan, Nebraska, Ohio State, Oklahoma, Utah, Wisconsin, and Yale (20). Most of these early films were silent visual recordings made, for example, by a botanist interested in the possibilities of time-lapse photography; by an engineer studying high-speed phenomena in slow motion; by a football coach recording his victories and defeats (17). With the introduction of 16 mm a few institutions became associated with production projects of major importance. The *Chronicles of America* will be remembered as a widely used series of historical films produced by the Yale University Press in the late 1920's. A number of the first Erpi Classroom Films of the 1930's were made in collaboration with educational advisors from the University of Chicago. Immediately prior to World War II, Willard Van Dyke produced the well-known documentaries *And So They Live* and *Children Must Learn* for the Educational Film Institute of New York University (17).

EXTENT OF UNIVERSITY PRODUCTION

University film production, scattered and sporadic before the war, entered a new phase after 1945. The State University of Iowa pioneered in the creation of films which documented original ideas and teacher training, research techniques in medicine, and time and motion studies in engineering. The University of Missouri Film Production Department filmed research findings of its agricultural experimentation. Indiana University's Audio-Visual Center made filmic explanations of its philosophies and practices in education, art, and history. Ohio State University presented techniques developed in the school of medicine, the department of speech, and in home economics (19). In 1946 these film-making activities were coordinated through the formation of the University Film Producers Association. Within a few years this organization had an institutional membership of nearly 50 leading colleges and universities and a total individual membership of approximately 200. It began to hold annual conventions and to publish a quarterly *Journal of the University Film Producers Association* (17). By the end of 1953, the amount and quality of university production had increased to the extent that 13 colleges and universities entered a total of 32 films in the Golden Reel Film Festival of the first American Film Assembly.

The most comprehensive single source of information on college and university film production is still *Motion Picture and Filmstrip Productions by American Educational Institutions,* compiled for the Educational Film Library Association by the Audio-Visual Center, University of Michigan, in 1950.

> This survey was undertaken . . . to ascertain the number and character of motion pictures and filmstrips being produced by educational institutions in the United States. Questionnaires were sent to the presidents of colleges having a four year program and to the superintendents of the larger school systems of the country. . . . Replies to the questionnaires furnished information from 137 institutions producing motion pictures and filmstrips.

Additional films produced by educational institutions are described in *Agricultural Films Produced by Agricultural Colleges, State Extension Services, Universities and Other State Agencies,* prepared by the Motion Picture Service, Office of Information, U. S. Department of Agriculture. "This catalogue lists and describes 138 motion pictures. . . . All of the films are 16 mm, 66 with sound, 72 silent, 114 in color, and 24 in black and white" (15). The information from these two sources which pertains to the

schools of our survey is combined and reproduced in the table. In supplementing the EFLA report with the Department of Agriculture catalogue, we find that 36 of the 100 schools had produced (or had in production) 402 films by 1950-51. The titles listed in the two surveys reflect a predominant concern with agriculture and education, underlining the prominence of extension divisions and education departments as film producers as well as the interests of the organizations conducting the surveys.

UNIVERSITY PRODUCTION UNITS

An increasing amount of college and university production is being done by permanent production units consisting of from one to as many as 20 film specialists. A recent survey of nearly 100 film makers in more than 50 colleges and universities showed that 44 of these people were making films as members of audio-visual centers, departments, or services; 14 were employed by photographic divisions, departments, or centers; 11 were part of a television, motion picture, or communication center, department, or division. The remainder worked in departments of drama, fine arts, public relations, and miscellaneous organizational structures (17). Many of these units have become semicommercial in nature, drawing part of their support from the sale of films produced or from films made under contract with outside agencies. The Motion Picture Division of the Communication Center, University of North Carolina, might serve as one example of university-sponsored film units.

TABLE I—FILM PRODUCTION IN THE 100 LARGEST COLLEGES AND UNIVERSITIES IN THE UNITED STATES, THROUGH 1950

State	School and Producing Agency	Number of Films			
		General Interest	Local Interest	In Preparation in 1950	Total
Ala.	Alabama Polytechnic Institute	....	....	....	3
	Agricultural Extension Service	3	....	....	
Calif.	University of California				48
	Berkeley: University Extension	7	3	2	
	Agricultural Extension Service	9			
	Los Angeles: Department of Theater Arts, Motion Picture Division	6	11	10	
	University of Southern California	9	....	4	13
Conn.	University of Connecticut	....	1	4	5

TABLE I—*Continued*

State	School and Producing Agency	Number of Films			
		General Interest	Interest Local	In Preparation in 1950	Total
Fla.	University of Florida	....	2	2	6
	College of Agriculture, Agricultural Extension Service	2	....	....	
Ga.	University of Georgia	....	....	....	23
	Southern Educational Film Production Service	17	....	6	
Ill.	Illinois Institute of Technology	2	....	1	3
	Roosevelt University	....	2	....	2
	University of Illinois	....	....	....	10
	Visual Aids Service	6	4	....	
Ind.	Purdue University	....	....	....	1
	Agricultural Extension Service	1	....	....	
	Indiana University	....	....	....	28
	Audio-Visual Center	11	7	10	
Iowa	Iowa State College	....	....	....	4
	Visual Instruction Service	4	....	....	
	State University of Iowa	....	....	....	11
	Bureau of Audio-Visual Instruction	10	1	....	
Md.	University of Maryland	....	....	....	3
	Agricultural Extension Service, Film Library	3	....	....	
Mich.	Michigan State College	....	....	....	1
	Agricultural Extension Service	1	....	....	
	University of Michigan	....	....	....	9
	Audio-Visual Education Center	2	4	3	
	Wayne University	....	....	....	2
	Audio-Visual Materials Consultation Bureau	....	....	2	
Minn.	University of Minnesota	....	....	....	12
	Audio-Visual Education Service	8	....	3	
	University of Minnesota Farm, Agricultural Extension Service	1	....	....	
Mo.	University of Missouri	5	....	....	8
	College of Agriculture, Agricultural Extension Service	3	....	....	
Neb.	University of Nebraska	....	....	....	15
	Bureau of Audio-Visual Instruction	6	2	5	
	College of Agriculture, Agricultural Extension Service	2	....	....	
N. Y.	Cornell University	....	....	....	34
	College of Agriculture, Agricultural Extension Service	32	....	....	
	Photographic Science Laboratory	2	....	....	

TABLE I—*Continued*

State	School and Producing Agency	Number of Films			
		General Interest	Local Interest	In Preparation in 1950	Total
N. Y.	New York University	....	....	....	53
	Washington Square College, Department of Motion Pictures	2	51	....	
	Syracuse University	3	4	5	12
N. C.	University of North Carolina	....	....	....	8
	Communication Center	2	1	5	
Ohio	Ohio State University	28	5	....	33
Okla.	University of Oklahoma	....	....	....	11
	Audio-Visual Education Department	5	3	3	
Ore.	Oregon State College	....	....	....	8
	Department of Visual Instruction	8	....	....	
Penn.	Pennsylvania State University*	....	....	....	....
Tenn.	University of Tennessee	....	....	....	4
	Division of University Extension	1	2	1	
Tex.	Agricultural and Mechanical College of Texas Agricultural Extension Service	3	....	....	3
	Texas Technological College	....	....	....	1
	Extension Service	....	1	....	
	University of Texas	....	....	....	2
	Visual Instruction Bureau	....	2	....	
Utah	University of Utah	3	1	....	4
Wash.	State College of Washington	....	....	....	2
	Audio-Visual Center	2	....	....	
	University of Washington	....	....	....	3
	Instructional Materials Center	2	....	1	
W. Va.	West Virginia University	....	....	....	4
	West Virginia University Library, Audio-Visual Aids Department	2	2	....	
Wis.	University of Wisconsin	....	....	....	13
	Bureau of Audio-Visual Instruction	9	....	4	
Total		222	109	71	402

* Though neither the EFLA nor the U.S.D.A. reports list it, Pennsylvania State University now has a Motion Picture and Recording Studio. Production in 1952-53 included *Painting a True Fresco, The Keyston Idea, T. B. Nurse Wallace,* and *Portrait of a County.*

Established in 1945 the Center offers departments of the University, colleges, schools and nonprofit organizations in the

state, a complete service in motion picture production. During 1949-50, four 16 mm color films were completed: *Diamond Cutting,* showing procedures used in cutting diamonds; *Basic Operative Technique,* demonstrating surgical techniques as performed in the removal of a dog's spleen; *In the Name of Freedom,* picturing various aspects of the university campus and curriculum; and *My Name Is Durham,* publicizing the Durham (N. C.) Community Chest. Three 16 mm color films for North Carolina's Department of Conservation and Development were in production during 1951. One of these, *North Carolina—Variety Vacationland,* a 20-minute travelogue, won a First Award in the Greater Boston Film Festival upon its completion. A second, *North Carolina—The Tarheel State,* is now available. Additional films released in 1951-52 included one for the North Carolina Industrial Commission on safety in the textile industry, *As Others See Us,* one for the Junior Order of United American Mechanics, *Spring of Our Faith,* and one for the people of Dare County, N. C., *Dare, Birthplace of America.* Students in motion picture classes had an opportunity to gain practical experience by participating in the making of these films.

Another representative film production unit was established by the Audio-Visual Center of Indiana University, under the direction of L. C. Larson, in 1946. This unit was built around an experienced film maker, brought in to make films and to start a training program to teach others to make them. At first, activities were confined to producing such specialized films as *How to Make Handmade Lantern Slides* and *Your Indiana State Parks.* Although primarily for college and adult groups, these films were used extensively by high-school classes. Later the Audio-Visual Center produced others specifically for high school use such as, the "Craftsmanship in Clay" series, five ceramics films for crafts classes, and *Safety in the Chemistry Laboratory.* During 1952-53 the film production unit completed 27 reels; by the end of 1953 the Center had raised the total to 65 educational films (11). The 1952-53 titles included *Conspiracy in Kyoto, The Elementary School Teacher: Beginning Student Teaching, The Legislative Process, Marching Band Fundamentals, Plan To Live,* and *Wet Mounting Pictorial Materials.* The staff of the Center is now made up of members who have taught at various levels and film makers who are educators as well (3).

STUDENT AND FACULTY PRODUCTION

Production of completed and salable films is becoming increasingly common in college and university motion picture courses. The films listed for U.C.L.A., U.S.C., and N.Y.U. in the table are the work of students in cinema departments. A few of these student films receive widespread distribution. In 1927 Syracuse University, in connection with its dramatic activities, made the first full-length film to be shown by a university in a commercial theater for a regular run, according to the *Syracuse University Bulletin: School of Speech and Dramatic Art, 1952-1954.* Cinematography classes at the State University of Iowa have supplied footage for the half-hour general education program of WOC-TV, Davenport, and eventually plan to present complete films for television screening. The University of California at Los Angeles, Extension Division, has established an Educational Film Sales Department which sells 16 mm prints of sound films produced in the University's Department of Theater Arts. Films made in the Cinema Department of the University of Southern California have been distributed by McGraw-Hill Text-Films.

On several campuses informal student groups and film societies also have produced films. In 1952-53, Yale students filmed a modern dress version of Chaucer's *The Pardoner's Tale,* and, during the same year, members of the Roosevelt University Film Society made two short experimental films entitled *Baby Bounce* and *Shock Treatment. Films in Review* has carried accounts of undergraduate film making by groups at Michigan (5) and Harvard (22), and by individual students in various schools. Of the latter, one of the most interesting is by John Legris, of Oakland, California (10). In addition, *Films in Review* has published a series of letters from various individuals each claiming to have been the first undergraduate to produce a full-length feature. Theodore Huff boasted the earliest production with a silent version of Shaw's *Caesar and Cleopatra* at Princeton in 1927 (6).

Examples of student film making can be drawn from other schools not among the 100 surveyed. At Bowling Green State University, the Film Workshop of the Film Arts Society has produced a number of short films, including cartoons, film poems, and instructional films. In 1952 the Workshop completed its first color film. The Swarthmore College Camera Club made *The Crime* in 1952. This is a 20-minute allegorical film of the Biblical story of Adam and Eve, and their fall from grace, which was later

distributed commercially. At the California Institute of Technology three experimental films were produced by members of Film Classics, a student film society, during 1952-53: *Echoes, The Two Nymphs of the Well,* and *East to Skid Row.* The latter has been shown commercially several times at the Coronet Theater in Los Angeles (9).

An annual intercollegiate awards contest for the best amateur motion picture conceived and created in an American college has been sponsored by the Screen Producers Guild since 1953. The first Gold Award Medallion was presented to the University of Southern California, honoring Herbert Skoble, student director, who produced *Let Me See.* The Guild's Silver Award was presented to the University of California at Los Angeles for *Treasure in a Garbage Can,* and its Bronze Award to the University of Minnesota for *Art of Seeing.* In a letter to deans and department heads of 104 schools, announcing the 1954 competition, Arthur Freed, President of the Screen Producers Guild, said:

> We believe that young people who contribute their efforts to such films should be not only recognized but encouraged to participate in the imaginative and practical arts involved, feeling that this is the first realistic and tangible contact that has been extended between professional film producers and students seeking to enter the motion picture field.

College teachers have continued to record experiments and travels on film and occasionally to make teaching films for use by their classes. For example, Sister Helene, associate professor of fine arts at Siena Heights College, has prepared a film on galvanoplastics, sculpture by electrodeposits of metal. Recently a few college teachers have turned to film as a means of creative expression even as they had earlier written novels or plays, or painted pictures. During 1953 Allen Downs, Department of Art, University of Minnesota, produced an interesting impressionistic film study of a familiar subject in *Freight Stop.* Roger Tilton, Department of Fine Arts, School of General Studies, Columbia University, has completed a teaching film for use in art appreciation, *New Ways of Seeing,* and a lively study of an important aspect of American culture, *Jazz Dance.* He is currently at work on *Laughing Boy,* an experimental narrative film, and *Country Dance,* a sequel to the earlier dance film.

SOME CONCLUDING OBSERVATIONS

Film production, in one form or another, then, is widespread among colleges and universities. In the university-sponsored pro-

duction units, which are responsible for the majority of the films, emphasis seems to be placed on the number and quality produced, with a consequent reliance on professional technicians, rather than on the possibilities for training student film makers. Those students who become members of a production crew undoubtedly learn something about the art and technique of film. But even while learning film making by making films—as Neal Keehn, himself a 16 mm producer, points out—"a good many of the newcomer's fumbling errors can be eliminated or at least reduced by some formal training which is seldom available on the job except on a catch-as-catch-can basis" (1). If universities and colleges remain free from direct competition with commercial producers, they can, perhaps, afford to train more film makers and explore new film techniques and content. Such an approach would be of great assistance in the development of the motion picture as a medium for expression, education, and communication.

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LIKING AND LEARNING FROM EDUCATIONAL TELEVISION

• IRVING RODGERS MERRILL

Testing the hypothesis that "like-dislike" ratings of a TV kinescope shown as a film correlate negatively with "I am learning" ratings, the author showed that the "liking" scale measured different attributes of the program than did the "learning" scale. Irving R. Merrill is Director of Research at TV Station WKAR-TV, Michigan State University.

AUDIENCE INTEREST *VERSUS* AMOUNTS OF LEARNING

THE USEFULNESS of educational television has been challenged indirectly by results of an experimental study by Twyford, which compared profiles of two rating scales used in evaluating a nine-minute instructional sound film having discrete factual content (9). He found that a profile constructed from a rating scale of *like-dislike* correlated negatively with a subjective rating profile in which the audience reported *I am learning* on a five-point rating scale.

If such results also apply to longer programs presented by an educational television station, the broadcaster may well face a dilemma. It has been customary to assume that the television program must be well liked by sufficient viewers to justify the expense of televising the program. If the above findings hold true, however, the more popular the program becomes, the less learning can be expected to take place.

Perhaps the closest television equivalent to an instructional film would be a single program of a telecourse series, but such results would have a less undesirable effect upon telecourses than upon other educational series, because the broadcast of a course of instruction carrying college credit is assumed to have a somewhat limited appeal. Therefore, it was decided to duplicate the Twyford experiment using a sample from the WKAR-TV program *Town and Country*, a daily 45-minute series of telecasts directed toward the widest possible audience of farmers and homemakers.

Another reason for selecting this program lay in its diverse appeal. The producers wished evidence on the problem of whether a single program could successfully appeal to both farm men and homemakers. The producers' immediate interest lay in a comparison of the profiles of these two groups using a rating scale of *like-dislike,* with a view toward program improvement by removing sections having low profile amplitude and increasing the amount of program content producing profile peaks, using the method employed by Hallonquist (1). They were also interested in discovering why the amplitude varied, which called for the use of the questionnaire and group discussion methods as employed by Hallonquist and Suchman (2:318-20).

One general problem of the experiment, therefore, was to secure information on audience likes and dislikes which would aid in increasing program popularity. The other general problem was to determine if the negative correlation between profiles of two rating scales for a nine-minute sound film having discrete factual content would hold true for a kinescope recording of a 45-minute television program with a more varied content.

These two general problems were posed specifically in the following questions: (a) Do the *liking* profiles for farm men and homemaker audiences coincide sufficiently to justify the present program format? (b) If so, can the programing within low amplitude portions of the profiles be altered to increase the favorable rating for both groups? (c) Do *Town and Country* profile ratings of *liking* correlate negatively with subjective ratings of learning?

METHOD

The problems required an experimental design which would permit comparison of such heterogeneous groups as farm men and homemakers from both urban and rural homes using a single *liking* rating scale, and a comparison of a homogeneous group using the two different scales of *liking* and *learning.* The experimental de-

	Liking		*Learning*	
Farm Men	Rural			
	Rural			
Homemakers	Rural	XXXX	Rural	XXXX
	XXXX	Urban	XXXX	Urban

Figure 1

Experimental design, showing sex and residence for each group of 10 subjects, and indicating the rating scale used in the WKAR-TV Program Analyzer sessions.

sign adopted is shown in Figure 1. It was assumed that sex differences would account for the major contrast in *liking* profiles. Therefore, the homemaker audience of 20 women was made up of 10 rural homemakers and 10 urban homemakers. Any serious discrepancy in the assumption that rural and urban women would react similarly to the *liking* rating scale could have been detected and handled, since Twyford states that satisfactory general *liking* profile trends may be obtained from 10 Subjects (10:259-60). A similar group of 10 rural homemakers and 10 urban homemakers was tested with the subjective *learning* scale.

As indicated in Figure 1, a total of 60 subjects were tested. Farm men were adults with ages ranging evenly from 20 to 60 years. All homemakers were married and distributed evenly through the same age range.

The WKAR-TV Program Analyzer was built according to the construction details furnished by Twyford for the Rating Summation Device. One minor change was made. Where the Twyford learning profile equipment dial read *none, little, average, much,* and *most learning,* the WKAR-TV Program Analyzer dial read *1, 2, 3, 4,* and *5.* This permitted use of the same equipment for both the *liking* and *learning* ratings, since both used a five-point scale. However, a 3′ x 4′ poster of the Twyford *learning* dial was kept in full view of the group during the *learning* session. A poster of similar size showing the dial was used during the *liking* session with the equivalencies *dislike much, dislike, indifferent, like, much* illustrated. The rating instructions for the *learning* profile were those used by Twyford (10:254).

The techniques of measurement employed duplicated as closely as possible the procedure for using the Rating Summation Device (9).

In addition to the above techniques, during the interview sessions with each group a *personality index* ranking for each performer was constructed, based upon a forced choice for each subject. Each subject had to indicate the performer he liked best and least. The index was based upon the formula: $\frac{I=\Sigma(+)+\Sigma(-)}{N}$

where I was the performer's *personality index* number, Σ (+) was the sum of votes for liked best, $\Sigma(-)$ was the sum of votes for liked least, and N was the total number of subjects participating in the voting. A rank order for all seven performers was constructed on

the results of the computation of the formula. This type of index was selected because it is a summation of rankings for the group, just as the WKAR-TV Program Analyzer profile itself is a summation of the individual ratings within the group. A *topic index* ranking for each of the seven feature segments of the program was prepared in a similar fashion. For each group interviewed, voting on the performers preceded voting on the topics. No attempt to prepare an index on production quality was made because previous studies indicated the average subject could not distinguish consistently between production and content (2:317).

RESULTS

Do Liking Profiles for Farm Men and Homemakers Coincide Sufficienty To Justify the Format of the Present Program?

A test of the reliability of the measuring instrument was made by comparing the *liking* profiles of the two groups of farm men. The product-moment correlation between these profiles was as follows: $r = +.76$ (significant at .01 level). The test of the reliability of r against the null hypothesis was made using the formula:

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}}$$

The degree of relationship represented by this obtained coefficient was interpreted as high, and the results of the measurement were considered reliable for the purposes of this experiment.

A comparison of the *liking* profiles of a group of rural homemakers with a group of urban homemakers revealed the following product-moment correlation: $r = +.46$ (significant at .01 level). While this correlation was considered substantial, it was much lower than that for the two groups of farm men. The lower degree of correlation between the profiles of the rural and urban homemakers was interpreted as indicating that the likes and dislikes of these homemakers were similar, but far from identical.

A comparison of the *liking* profiles of all farm men and all homemakers tested revealed the following product-moment correlation: $r = -.42$ (significant at .01 level). This degree of relationship was also considered substantial, and was interpreted as indicating farm men and homemakers were in substantial disagreement about liked and disliked portions of the program. However, both farm men and homemakers gave the entire program a mean

rating which fell between like and indifferent (4.0—3.0). This was interpreted as indicating that despite the differences noted, both groups indicated a general liking for the entire program. The mean program rating for the two groups of farm men was 3.47, and for the two groups of homemakers was 3.61.

From these results it was concluded that the *liking* profiles for the farm men audience and the homemaker audience coincided sufficiently to justify the format of the present program.

Can the Programing Within the Low Amplitude of the Profiles Be Altered Sufficiently To Increase the Favorable Rating for Both Groups?

Results which applied to this question were primarily of local interest, and were treated in detail in WKAR-TV Research Report 552M. Also included in this report were additional information regarding the previous question, a copy of the questionnaire, a program run-down, and rating instructions for the *liking* sessions (5).

Do "Town and Country" Ratings of Liking Correlate Negatively With Subjective Learning Ratings?

The beginning step of analysis was to test the reliability of the WKAR-TV Program Analyzer as instrument for measuring learning, as indicated by a subjective rating on a five-point scale. The product-moment correlation between the *learning* profile ratings for rural and urban homemakers was as follows: $r = +.68$ (significant at .01 level). A comparison with the *liking* correlation of $+.46$ for rural and urban homemakers suggested the interpretation that the two types of homemakers agreed more closely upon the items learned from the program than they agreed upon the items liked within the program.

As indicated in Figure 1, it was possible to compare the *liking* and *learning* profiles for rural homemakers and to make a separate comparison for urban homemakers. Because the correlation between the *liking* profile ratings of rural and urban homemakers was not high, it was decided that separate correlations for each type of homemaker would provide a more straightforward test of the Twyford hypothesis. The product-moment correlation between the *liking* and *learning* profile ratings for urban homemakers was

as follows: $r = +.03$ (not significant). A similar correlation for rural homemakers was as follows: $r = -.26$ (significant at .01 level). The only malfunction of the WKAR-TV Program Analyzer occurred just before the *learning* session for rural homemakers began. Although it was corrected before starting the test, the dial settings at each station were inadvertently left at the *average learning* setting instead of at the *none learning* setting prescribed by Twyford.

In either possible treatment of results, the most acceptable interpretation is that the data of the present experiment fail to confirm the hypothesis that ratings of *liking* correlate negatively with subjective *learning* ratings for this kind of educational television program. If the correlation for urban homemakers (which followed the Twyford experiment precisely) is alone accepted, the hypothesis is not confirmed. If one assumes that the deviation in instructions would not sufficiently distort a correlation based on the means of all homemakers tested, then the hypothesis again is not confirmed.

The *liking* and *learning* rating profiles for urban homemakers are shown in Figure 2. Inspection appeared to confirm the com-

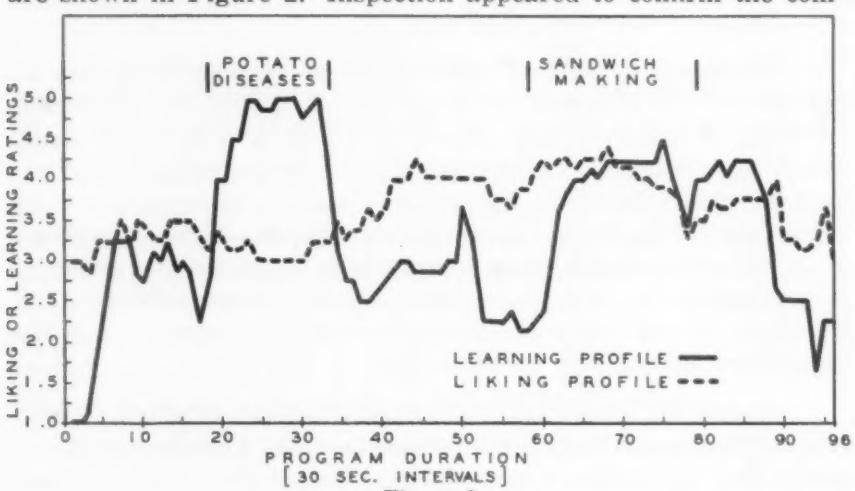

Figure 2

WKAR-TV Program Analyzer "Town and Country" Profiles for *Liking* and *Learning* Scales for Urban Homemakers

putation indicating no correlation between the two profiles. It also revealed two apparently deviant cases, the feature segment on potato diseases and the segment on sandwich making. Each case

indicated a high rating for the *learning* profile. The *liking* rating profile was low for potato diseases and high for sandwich making. The product-moment correlation between profiles for the potato diseases segment was as follows: $r = -.40$ (significant at .15 level), and for the sandwich-making segment was as follows: $r = +.56$ (significant at .01 level). Implications of these deviant cases will be further discussed.

Supplementary data pertaining to these deviant cases was obtained from the rankings within the *personality* and *topic*

TABLE 1—RANKING BY HOMEMAKERS OF TWO PERFORMERS ACCORDING TO TYPE OF PROGRAM ANALYZER SESSION PRECEDING THE RANKING

	Potato Disease Specialist		Sandwich Making Specialist	
	Liking	*Learning*	*Liking*	*Learning*
Urban Homemakers	5.5	2	7	5.5
Rural Homemakers	6	2	7	6

indexes. Table 1 shows the performer rankings for the two program segments were the same for rural and urban homemakers, but varied according to the rating scale used during the WKAR-TV Program Analyzer session.

The ranking of the two program segments according to the *topic index* is shown in Table 2. It indicates that both types of

TABLE 2—RANKING BY HOMEMAKERS OF TWO PROGRAM SEGMENTS ACCORDING TO TYPE OF PROGRAM ANALYZER SESSION PRECEDING THE RANKING

	Potato Diseases		Sandwich Making	
	Liking	*Learning*	*Liking*	*Learning*
Urban Homemakers	5	4	7	5.5
Rural Homemakers	5	1	7	2

homemakers who participated in a *liking* session responded to each segment identically. Those homemakers who participated in a *learning session* with the WKAR-TV Program Analyzer and then voted on the topics placed the two feature segments in the same relation to each other, but split as to how the two ranked in comparison with the remaining segments. What is perhaps the most important relationship exhibited by either Table is common to both. The degree of favorable opinion a performer or topic receives is related to whether it was viewed from the criterion of *liking* or

learning. Implications of these results will be discussed in succeeding sections.

DISCUSSION

If one tentatively accepts the conclusion that no correlation exists between *liking* and *learning* profiles for an educational television program of this type, one is faced with the special case of the program segment on potato diseases (which with a negative correlation conformed to the predictions of the Twyford hypothesis) and the program segment on sandwich making (which showed a positive correlation). Previous studies have shown the advantage of analysis of deviant cases (4). A description of the two segments is in order:

Potato Diseases

A farm crop specialist, seated behind a desk in an office set, slices a diseased potato, showing the signs of ring rot. He carefully points out potatoes suffer many diseases, but says he will discuss control of only two of them. He then verbally describes measures during planting, cultivation, and harvest to control and eliminate disease. Next, he shows the effect of lake blight on the potato leaves, and then verbally describes measures during planting, cultivation, and harvest to control this disease. He closes by indicating lake blight was the cause of the Irish potato famine, and offers a free pamphlet on potato diseases.

Sandwich Making

A home economist in white uniform behind a table demonstrates how to prepare 48 sandwiches in a single operation. The set is of a neutral background formed by draperies. Sandwich spread is placed on the bottom slices of bread, sandwich filling is scooped onto each, top slices are added, new bottom slices are placed on top of the completed sandwiches and the operation is repeated until sufficient sandwiches have been prepared. All sandwiches in a single stack are then cut at once. When all stacks are cut, each stack is wrapped separately.

On the basis of production quality, a panel of six trained professional production personnel all rated both segments equally high. These persons rated the home economist as a less capable performer, probably due to lack of previous experience. If one

assumes that the total effect of the program segment is the rough sum of the production quality, contribution of the performer, and topic dealt with, then the variations of these deviant cases must be explained in terms of either the performer, the topic, or both.

Turning to the topic, the sandwich-making segment is a demonstration of a pleasant exercise in motor control. The potato disease segment represents a depressing, threatening eventuality for homemaker, as well as farmer. The means of control are pictured as difficult, uncertain of success. Other diseases, also, are pictured as threatening the potato crop. In previous research, the attributes of topics similar to sandwich making have been described as *indulgent*, and attributes of topics similar to potato diseases have been described as *deprivational* (8). Two terms which attempt to tie the stimuli of different types of messages to psychological processes have been defined as *immediate reward* messages related to the central nervous system (sandwich making), and *delayed reward* messages related to the autonomic nervous system (potato diseases) (7: 292).

Since the *learning* rating profile for both feature segments is high, it is apparent that the *liking* profile represents the objective rating more closely related to the concept of immediate and delayed reward for the urban homemakers. If one assumes that production quality was approximately equal for both program segments, the fact that slightly less was learned during the sandwich-making segment may be attributed to the inexperience of the performer which interfered with learning. An assumption equally tenable at this stage is that increments of learning affecting the central nervous system particularly call forth rating responses unequal to those from increments particularly affecting the autonomic nervous system. Since high *learning* profile ratings are possible in the face of low *liking* profile ratings, one may predict that a *learning* session of the WKAR-TV Program Analyzer for farm men would result in a high *learning* profile for the segment on sandwich making.

Turning from the homemakers to the farm men, the concept of delayed reward explains the relatively low rating they gave the potato disease feature during the *liking* session. However, the concept of immediate reward suggests a prediction of a high rating for the sandwich-making feature during the *liking* session. This did not in fact occur, as the sandwich-making feature profile rating for both groups of farm men was the lowest of all program seg-

ments. At this point it might be assumed that another psychological process was overriding the effect of immediate reward, that these subjects were predisposed in such a way that they could not favorably identify themselves with this particular immediate reward topic. In short, the divergence of the *liking* profile rating of the farm men from that of the homemakers during the feature segment on sandwich making represents one measure of a difference in attitude (6: 127-30).

The *personality index* and *topic index* rankings prepared after having viewed an educational television program show the difficulty the viewer has in analyzing elements of a program segment, thus confirming previously reported research. However, the differences shown serve as helpful clues to the analysis of the rating profiles. As a result of conducting the interview sessions the writer had the subjective feeling that all groups reacted more intensely to the performer's personality than to the topic, with the result that the *topic index* may have thereby been contaminated. Whether this impression can be verified is a subject for further investigation.[1]

SUMMARY

The WKAR-TV Program Analyzer, an electric rating summation device, was used to test a kinescope of a composite television program for farm men and homemakers entitled *Town and Country*. Additional phases of the experiment involved interviews with each group tested on the Analyzer and completion of a questionnaire by each subject. The subjects consisted of 20 farm men, 20 rural homemakers and 20 urban homemakers. The WKAR-TV Program Analyzer tests included 10 subjects in each group.

The purpose of the study reported here is to test the hypothesis advanced by Twyford that ratings of *like-dislike* correlate negatively with subjective ratings of *I am learning* on a five-point scale.

Analysis of the WKAR-TV Program Analyzer profiles failed to confirm the Twyford hypothesis when it was applied to a 45-minute educational television program directed toward the widest

[1] After this research was completed, a new program analyzer study by Jorgensen dealing with the presentation of television news came to the writer's attention (3). Among other results Jorgensen reported no significant correlation between information gain (*learning*) as measured by an objective test and audience approval (*liking*) as measured by the Wisconsin Sequential Sampling Audience Analyzer. He also reported that program analyzer scores (*liking*) correlated to a low degree with expressions of interest (*topic index* rank) on a graphic rating scale. (Items in parenthesis show related measures used by the writer. These results appear in agreement with the related findings of the present study.)

possible audience of farm men and homemakers. The product-moment correlation between the *liking* and *learning* profile ratings of two groups of urban homemakers was as follows: $r = +.03$ (not significant). A similar correlation for two groups of rural homemakers was slightly negative, but not sufficiently so to justify a conclusion other than that no correlation existed between the two kinds of profile ratings.

Examination of feature segments within the program tested revealed that a segment on potato diseases produced the type of negative correlation predicted by Twyford. A feature on sandwich making produced a relatively good positive correlation between *liking* and *learning* rating profiles. These deviant cases received supplementary analysis.

Interview data permitted construction of a *personality index* which ranked all seven program features on the program on the scale *liked most-liked least*. The topics treated in the two feature affect the *personality index* rankings the homemakers gave the potato disease specialist and the sandwich-making specialist. However, such rankings were affected by whether the homemakers had previously participated in a *liking* or *learning* Program Analyzer session.

The interview data also permitted construction of a *topic index* which ranked all seven program features on the program on the scale *liked most-liked least*. The topics treated in the two feature segments were ranked practically identically by rural and urban homemakers who had observed them during a *liking* rating session. However, rural homemakers who had observed during a *learning* rating session ranked the potato disease and sandwich-making topics 1 and 2, while urban homemakers under the *learning* rating session ranked the topics 4 and 5, respectively.

Both of the two groups of farm men observed the program during a *liking* rating session. Both groups then gave identical rankings to performers on the *personality index;* that is, 2 for the potato disease specialist and 7 for the sandwich-making specialist. Generally similar, but not identical, rankings were given by both groups to the program features when the *topic index* was used.

The WKAR-TV Program Analyzer data showed that the *liking* scale measures different attributes of a program than does a *learning* scale. Analysis of two deviant cases among the seven pro-

gram segments suggested that, by observing certain precautions, the two scales produce an empirical measure of immediate and delayed reward, or attitude, according to the following hypotheses:

1. Given an adequate measure of homogeneity between groups, a profile rating of high for both the *liking* and *learning* scales indicates content of a type characterized by Schramm as immediate reward.

2. Given an adequate measure of homogeneity between groups, a profile rating of high for the *learning* scale and low for the *liking* scale indicates content of a type characterized as delayed reward.

3. Given an adequate measure of heterogeneity between groups, where both groups have a high profile rating on the *learning* scale and where one group has a high and the other group a low profile rating on the *liking* scale, the difference between groups on the *liking* scale is one measure of a difference in attitude.

Analysis of the *personality* and *topic indexes* indicates that the television viewer finds it difficult to rate elements of a program separately. A low ranking for a performer on the *personality index* appeared to produce a low ranking for the feature segment on the *topic index*, despite the fact that the same group gave the program segment a high *liking* rating during the Analyzer session, and clearly indicated the segment was very well liked during the interview session.

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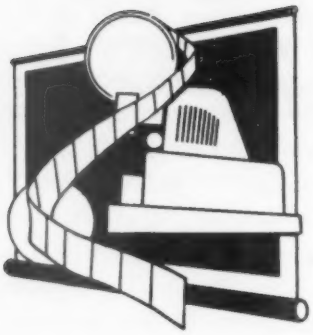


FILM

Reviewed by

• **NORMAN WOELFEL**

McGraw Hill's latest contribution of motion pictures to the field of teacher education is a notable one. Issues are raised in dramatic form which are really significant for young people entering the teaching profession. Each film runs for approximately 20 minutes and is packed with meaningful episodes, demonstrations, and problems. Certainly no teachers college class which uses these films singly or in sequence and properly builds student discussion and classroom lectures around them can fail to benefit immensely. One wonders, however, what exact relation the five films bear to the McGraw Hill textbook of the same title. Obviously the issues treated in the films are so important and so universal that any textbook worth its pages must discuss them. This is not to cast discredit on the Richey [1] text, which is not under review here, but merely to raise a serious question about the McGraw Hill policy of basing its professional films on certain of its own textbooks. The films must stand or fall by themselves and should properly be so universal in treatment and meaning that any course dealing with the same subject matter, irrespective of what textbook is used, or whether a textbook is used at all, can use them fruitfully. There may be special advantages to the McGraw Hill text-film policy, but to date this reviewer has not been insightful enough to see them.

NORMAN WOELFEL is professor of Education, Ohio State University.

[1] RICHEY, ROBERT WILLIAM. *Planning for Teaching.* New York: McGraw-Hill, 1952. 422 p.

Planning for Personal and Professional Growth

This film presents a series of effective case studies of public-school teachers who have rendered long service. Degrees of life-adjustment which run the gamut from happiness to profound unhappiness in the profession are portrayed. There is the teacher whose standards are too high for the majority of her students, but whose will is unbending, and who ends up a frustrated and ill-tempered old maid. There is the overly ambitious young man whose eyes are on a superintendency and whose life is split between his teaching duties and his progress toward a graduate degree. Fortunately he learns to take things more slowly and really find himself in his teaching duties. There is the married teacher who becomes tense because her students seem not to be learning fast enough, but who fortunately, also, learns to relax. And finally there is the teacher who has been well adjusted and happy in her profession for many years. Thinking about and discussing these vividly presented film personalities cannot help but stimulate young people to profound self-examination.

Effective Learning in the Elementary School

This is a very fascinating film because it sets out to show how a unit of study based upon American pioneer life got started, how it involved many areas of subject matter, distinctive areas of skill appealing to each individual in the class, and how it matured finally into a consummatory experience in which the parents of the boys and girls participated wholeheartedly. The film director was apparently determined that each episode in the film should be technically perfect, and technically the film has no flaws. Many mature teachers of the "progressive" persuasion will complain about what they will call lack of "naturalness" in the film. They may also assert that the language may here and there seem a bit stilted. However, it seems to this reviewer that the film director was essentially right in insisting on flawlessness of speech and action. Too many films have been ruined by picturing the "natural situation."

Guiding the Growth of Children

Here is an exploration of how a teacher, even though realizing that her grade group is a social unit which must pursue classroom experiences together, is able patiently and wisely to study each individual. She has learned the signs of maladjustment and is quick to recognize trouble at home, or trouble deep down inside. So here we see the slow reader, the shy child, the uninter-

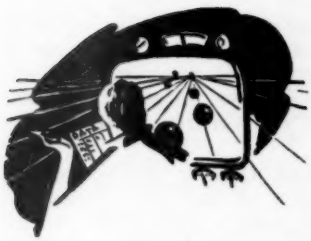
ested child, each in process of being skillfully analyzed and treated by a considerate and deeply thoughtful teacher.

Promoting Pupil Adjustment

This is the first of two films dealing with teaching on the secondary level. The emphasis in the sequence of film episodes is upon what a skilful teacher is able to do in influencing the personality and the social progress of her students. We find her deeply sensitive to the emotional depths of each individual, carefully prodding and suggesting and helping until particular difficulties are resolved or more widely understood.

Broader Concepts of Curriculum

The other film treating teaching on the secondary school level represents a series of classroom episodes demonstrating ways in which the teachers' leadership and the students' activities reach in the direction of broad objectives. Specific episodes show how school experiences help students to develop understandings and skills which, as they are enlarged through the years, eventuate in civic competence, vocational orientation, preparedness for family living and continuing good health. As is characteristic of all films in this series a tremendous amount of significant and interesting action has been packed into 20 minutes. Each film seems short because of this, and interest has no chance to lapse.



RESEARCH ABSTRACTS

TELEVISION

DOWELL, ERNEST C. *An Experiment in Training by Television.* Project 53-32. Training Analysis and Development, 3380th Technical Training Group, Keesler Air Force Base, 16 p. February 1954.

Purpose: The purpose of this research was to evaluate the effectiveness of closed circuit television as provided by a mobile television unit to teach electronics in comparison with conventional methods of presentation. Additionally it was desired to make kinephoto recordings suitable for use as training films in specific courses.

Procedure: Using professional personnel of a video squadron and a mobile television facility, three lessons on electronics were taught to 127 trainees. A control group was selected from subsequent classes. Instructors taught both experimental and control groups. All academic departments were requested to examine their needs for training films and prepare plans for producing the films.

Results: Equal results were obtained by the matched groups of students who received training by the same instructors but by different methods. Considerably more trained personnel were required to teach by the television method. A good instructor was found to be good before television cameras.

Fifty-two kine recordings were prepared. Many of the recordings could normally be justified only on the basis of providing a means for supplementing instruction when there is a shortage of competent instructors. Under the conditions of using a mobile television unit it was concluded that practical limitations are such that the use of live television in technical training cannot be justified on the basis of providing more economical mass training. —*L. Twyford*

CARPENTER, C. R., and GREENHILL, L. P. *An Investigation of Closed-Circuit Television for Teaching University Courses.* Project Number One, Research by the Instructional Film Research Program, Pennsylvania State University, University Park, Pennsylvania. 102 p. July 31, 1955.

Purpose: The objectives of this research were (a) To compare the relative effectiveness of conventional instruction with the same instruction presented over closed-circuit television for a full academic semester, (b) To study the acceptability of unmodified courses presented to students over closed-circuit television, (c) To investigate trends in *effectiveness* and acceptance during a full semester of regular instruction, (d) To study the feasibility of using moderate cost closed-circuit television for teaching selected university courses, (e) To study the acceptance of instructional television by administrators and faculty members, (f) To explore the possibilities of using closed-circuit television to extend the power and influence of good and superior instruction to large numbers of students.

Procedure: The following conditions were maintained to insure that the research was concerned with a practical application of television. Television equipment was used which could be afforded by schools that teach several hundred students at one time. The camera equipment was installed unobtrusively in a regular lecture room and receivers were installed in other rooms in the same building. Instructor control of the instructional situation was maintained in contrast to the usual dominance by moving cameras, rehearsals, and program direction. Instructors in psychology and chemistry courses gave their lectures and demonstrations as usually given but picture and sound were transmitted over two closed-circuit systems. About 100 students received instruction by television for an entire semester in each of three courses: general chemistry, general psychology, and psycholog of marriage. Scores made by these students were compared with scores made by students who received instruction in the television originating lecture room and with students who received standard instruction. Measures of effectiveness and acceptance of television instruction included (a) regular course examinations, (b) student reaction schedules, (c) student ratings of the course, (d) attitude scales, (e) the F scale, (f) election of future courses, (g) the *Marriage Happiness Prediction Inventory*, (h) logs of instructors, (i) records of receiving room observers, and (j) informal discussions and resumes. Information was obtained on costs, maintenance, and scheduling problems.

Results: Learning by the television groups was substantially equal to that of the regular instruction groups. Students who felt they were learning more by television thought (a) that they could see or hear better, (b) distractions were fewer, and (c) professors were better prepared. Students who thought they were learning less noted (a) a lack of interaction between professor and student, (b) boredom, (c) a lack of color in chemistry experiments, and (d) cameraman domination of what they must look at. Most students felt that it did not make much difference how the material was presented. Students taking the course with the instructor in the same room ranked psychology significantly higher among their courses than did students in the television receiving rooms. There were no significant differences found among control and experimental groups in the number of students electing to take an advanced course. Television instruction was generally accepted by students. Statements were reported by instructors and others concerned with the television instruction and problems encountered. Reactions ranged from very good to very bad with negative reactions predominating. Ten courses involving 3000 or more students were offered for experimental purposes for a continuation of the research. Cost per student credit unit by television was 60 percent of that for regular instruction. Moderate cost vidicon cameras were found to be quite satisfactory and 24 inch receivers were found to be very dependable. Initial tests of low cost vidicon cameras indicated that they were adequate for certain types of instruction. Report includes a selected bibliography, list of equipment used, equipment modifications, and evaluation instruments.—*L. Twyford*

COMPARATIVE EFFECTIVENESS OF TRAINING AIDS

VRIS, THOMAS. *A Comparison of Principles Training and Specific Training Using Several Types of Training Devices.* Technical Report SDC 269-7-102. Research by the Instructional Film Research Program, Pennsylvania State University for the Special Devices Center, Office of Naval Research, Port Washington, L. I., N. Y. 28 p. July 20, 1955.

Purpose: This study was done to discover whether three-dimensional training aids might be used to advantage to teach motor skills. Previous research studies have shown that there is no significant difference in the instructional effectiveness of graphic materials, models, and cutaways for teaching factual information. The research was designed so as to discover whether teaching of general principles of performing a skill (principles training) was more effective than teaching the specific operation (specifics training).

Procedure: The perceptual-motor skill used in this study was the operation of sound motion picture projectors. The three instructional aids to be compared were (a) an Ampro projector, (b) a three-dimensional modification of the Ampro projector, and (c) a two-dimensional representation of the three-dimensional modification. The two training procedures compared were (a) specifics training in which the specific operation was demonstrated and the steps were explained, and (b) principles training which was similar to specifics training but was supplemented by stated reasons why various steps are performed in the operation. A performance test on the Ampro projector was used to measure learning. A performance test on a Bell and Howell projector was used to measure response generalization. In an audio-visual course, 144 college students were used in the experiment.

Results: For teaching a complex motor skill it was found that (a) a three dimensional model and the actual equipment were equally effective and each is better than a two-dimensional aid, (b) when the task must be performed on other related equipment it is better to teach principles rather than specifics, and (c) principles training and specifics training were equally effective methods of instruction when two-dimensional aids were used. It was recommended that three-dimensional aids be used in preference to two-dimensional aids for teaching motor skills such as the one studied. If it is likely that the training aid will be used to teach a skill to be applied to related equipment then the instruction should emphasize the principles involved.—*L. Twyford*

MURNIN, JOSEPH A. *Comparison of Training Media: Transfer of Principles Involved in a Manipulation Skill; Operation of the Aircraft Load Adjustor Slide Rule.* Technical Report SDC 269-7-103. Research by the Instructional Film Research Program, Pennsylvania State University for the Special Devices Center, Office of Naval Research, Port Washington, L. I., N. Y. 36 p. September 20, 1955.

Purpose: This study was done to give evidence on the value of a transparency, a trainer, and the actual equipment for providing transfer of training in teaching the manipulative skill of operating the aircraft load adjustor slide rule. Previous studies indicated that a mockup, cutaway, and chart were equally effective for teaching conceptual information but that a model was superior for teaching a skill.

Procedure: Three methods of instruction were compared in this research. They were (a) the Weight and Balance Trainer, (b) transparency of model planes, and (c) the individual slide rule. A paper-pencil test was used to measure consistency of instruction within methods and a performance test was used as the learning criterion. One hundred and thirty-six trainees participated in the experiment.

Results: For teaching transfer of weight and balance principles from one aircraft to another aircraft (a) the individual load adjustor slide rule was as effective as the Trainer, (b) transparencies of the aircraft models were not as effective as the Trainer. For teaching the transfer of principles of weight-and-balance from one aircraft type to a different aircraft the use of the individual aircraft load adjustor slide rule was recommended as the instructional aid. —*L. Twyford*

OTHER PUBLICATIONS

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